TECHNICAL MANUAL

SERVICE AND CIRCUIT DIAGRAMS

RADIO RECEIVER R-1283/GRC

(AIRBORNE INSTRUMENTS LABORATORY)

F34601-72-D-0655

THIS PUBLICATION REPLACES T.O. 31T2-5SSVR-2 DATED 15 NOVEMBER 1966 AND SUPPLEMENT T.O. 31R2-5SSVR-2C DATED 13 JULY 1978.

PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE

17 JULY 1980

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INTRODUCTION

This publication contains information covering the description, installation, operation, and maintenance of the Radio Receiver R-1283/GRC; circuit diagrams are also included. Chapter 1 contains general information about the receiver, a summary of its capabilities and limitations, and two lists, one of equipment supplied and one of equipment required but not supplied. Chapter 2 contains information necessary for installation planning and logistics, installation procedures, and instructions for preparation for reshipment. Chapter 3 contains information concerning the operation of the receiver, and includes complete operating procedures. Chapter 4 gives the principles of operation for the receiver, including its subassemblies and components. Chapter 5 contains maintenance and overhaul information for the receiver, at both the organization/field level and the depot level. Chapter 6 contains the circuit schematic diagrams of the receiver and its subassemblies.

The receiver is designed to accept and detect pulse-modulated, amplitude-modulated, frequency-modulated, and continuous-wave signals in the 30 to 300 Mc frequency range, and to produce video and audio outputs as well as indications of the relative signal strength or video signal level.

The following military specifications and standards were used in the preparation of this technical manual:

MIL-T-9941, Technical Manuals: Ground C-E Equipment Facility, Site, and System, Preparation of

MIL-M-4410, Technical Manuals: Title Page, List of Effective Pages, and Reproduction Assembly Sheet; Photolith Negatives; Printing; and Binders

MIL-STD-12, Abbreviations for Use on Drawings and in Technical-Type Publications

MIL-STD-15, Electrical and Electronic Symbols

MIL-STD-16, Electrical and Electronic Reference Designations

MIL-STD-280, Definition of Terms for Equipment Divisions

Figure 1-1. Radio Receiver R-1283/GRC

CHAPTER 1
GENERAL INFORMATION

1-1. DESCRIPTION AND PURPOSE.

1-2. The Radio Receiver R-1283/GRC is a superheterodyne vhf receiver which covers the frequency range of 30 to 300 Mc in two bands. The lower band (referred to as band A) covers the frequency range of 30 to 90 Mc; the upper band (band B) covers the frequency range of 90 to 300 Mc. Except for the tuners, which contain tubes, all circuitry is transistorized. The receiver is capable of accepting and detecting pulse-modulated, amplitude-modulated, frequency-modulated, and continuous-wave signals in both bands, and produces video and audio outputs as well as an indication of the relative signal strength or video signal level. The receiver provides three selectable i-f bandwidths, which are 3 Mc, 300 kc, and 60 kc. Figure 1-1 illustrates the receiver.

1-3. The receiver is designed to operate with the Panoramic Indicator IP-805/GRC (an output of the 21.4-Mc i-f is supplied for this unit). In addition, the receiver can be used alone, as a standard laboratory vhf receiver, producing audio or video outputs as desired.

1-4. LEADING PARTICULARS AND CAPABILITIES AND LIMITATIONS.

1-5. Information regarding the features and characteristics of the receiver is contained in tables 1-1 and 1-2. Table 1-1 gives the leading particulars of the receiver, while table 1-2 gives its capabilities and limitations.

1-6. EQUIPMENT SUPPLIED.

1-7. Table 1-3 lists the equipment supplied with the receiver.

1-8. EQUIPMENT REQUIRED BUT NOT SUPPLIED.

1-9. Table 1-4 lists the equipment required to operate, test, or maintain the receiver, which is not supplied with the receiver.

Table 1-1. Leading Particulars

Primary Power Required	105 to 130 volts ac, single phase, 48 to 62 cps, 50 watts maximum.
Dimensions	19 inches wide by 3-1/2 inches high by 17-1/2 inches deep.
Weight	28 pounds maximum.

Table 1-2. Capabilities and Limitations (Sheet 1 of 3)

Characteristic	Capability or Limitation
Frequency Range	30 to 90 Mc (band A); 90 to 300 Mc (band B)
Tuning Accuracy	0.7 percent of indicated frequency
Tuning Calibration	500-kc increments (band A); 1-Mc increments (band B)
Input Impedance	50 ohms unbalanced (maximum)
Input Vswr (maximum)	10:1 (band A); 3:1 (band B)
Intermediate Frequency	21.4 Mc
3-Db Bandwidth (I-F)	Selectable: 3 Mc, 300 kc, or 60 kc
Noise Figure (maximum)	2.5 db at 30 Mc, 4.5 db at 90 Mc (band A); 5 db at 90 Mc, 9 db at 300 Mc (band B)

Table 1-2. Capabilities and Limitations (Sheet 2 of 3)

Characteristic	Capability or Limitation
I-F Rejection (minimum)	52 db (band A); 78 db (band B)
Image Rejection (minimum)	58 db (band A); 48 db (band B)
Spurious Response Rejection (minimum)	50 db
Intermodulation Distortion	63 db at 30 Mc, 73 db at 90 Mc (band A); 68 db at 90 Mc, 75 db at 300 Mc (band B)
Local Oscillator Reradiation (maximum)	15 μv (band A); 25 μv (band B)
Local Oscillator Stability	±20 kc for 10-percent line change; 20 kc (maximum) at 25°C, 30 kc (maximum) for 10° change (band A); 40 kc (maximum) at 25°C, 60 kc (maximum) for 10° change (band B)
Dynamic Range	80 db with agc; 95 db without agc
Bfo Range	±5 kc
Bfo Stability	±500 cps
Cor Sensitivity	0.5 μv
Cor Delay	Selectable: 0, 3, or 10 seconds ±10 percent
Video Output	1.5 volts peak to peak into 100 ohms
Video Response	100 cps to 1.5 Mc within ±3 db
Video Rise/Fall Times	0.3 μsec, 5-percent overshoot
Audio Output	0.1 watt into 600 ohms
Audio Response	75 cps to 15 kc (3-db points)
Audio Amplifier Hum and Noise	-60 db minimum
Sensitivity	
A-M (60 and 300 kc)	2 μv, 50-percent modulation at 1 kc, 14 db signal to noise
Fm (300 kc)	4 μv, 100-kc deviation at 1 kc, 21 db signal to noise
Fm (60 kc)	2 μv, 18-kc deviation at 1 kc, 20 db signal to noise
Pulse (3 Mc)	1-μsec pulse, -94 dbm tangential
Output Stability	
A-M	Vary less than 15 db with inputs from 2 μv to 10 mv and with agc
Fm	Vary less than 2 db with inputs from 1.5 μv to 10 mv
Agc	
Normal	0.2 second charge and 0.2 second discharge (maximum)
Pulse	20-db noise cutback for pulses 40 db above tangential sensitivity; 0.3-second charge and 0.5-second discharge (maximum); 6-db (maximum) pulse-amplitude variation for 20 db to 60 db above tangential sensitivity input change.
Outputs	Local oscillator panoramic indicator unit (i-f) video output audio output i-f test cor indication cor contacts signal strength or video level (meter indication) tuning error (meter indication) frequency indication (tuning dials)

Table 1-2. Capabilities and Limitations (Sheet 3 of 3)

Characteristic	Capability or Limitation
Operating Conditions	
Ambient Temperature	0 to 55°C (continuous operation)
Humidity	95 percent relative at 30°C (continuous operation)

Table 1-3. Equipment Supplied

Official Nomenclature	Common Name	Description	Usable on Code
Receiver, Radio, R-1283/GRC	Receiver		
Power Cable Adapter, AIL 990076-1	Adapter	3-prong to 2-prong plug adapter	

Table 1-4. Equipment Required But Not Supplied

Name	Manufacturer	Model No.
Oscilloscope	Tektronix, Inc.	545A with type CA preamplifier
Sweep Generator	Jerrold Electronics Corp.	900B
Pulse Generator	Hewlett-Packard Co.	212A
Vhf Signal Generator	Hewlett-Packard Co. Marconi Instruments	608C TF 995A. 2M
Noise Generator	Polytechnic Research Development	904A
Video Test Oscillator	Hewlett-Packard Co.	650A
Audio Generator	Hewlett-Packard Co.	200CD
Rf Voltmeter	Boonton Radio Corp.	91CA
Vacuum Tube Voltmeter	Hewlett-Packard Co.	400D
Volt-Ohm-Milliammeter	Triplett Electrical Instruments Co.	630
Digital Voltmeter	Non-Linear Systems, Inc. John Fluke Mfg. Co., Inc.	484A or 454A 801
Electronic Counter	Hewlett-Packard Co.	5245L
Frequency Converter	Hewlett-Packard Co.	5253B
Digital Counter	Berkeley Dynamics	5210
Attenuators	Kay Electric Co. Hewlett-Packard Co.	30-0 355D
Thermocouple	Thermo Electric Co., Inc	80237
Adapters, BNC to rf miniature	Adapter, connector, amphenol part number 47275,MFR code 74868.	
Power Sources:		
-12 volts dc	Power Design	50150A
+12 volts dc	Power Design	50150A
+110 volts dc	Lambda Electronics Corp.	50
6.3 volts, 60 cps ac	General Radio Corp.	W2MT
115 volts, 60 cps ac	General Radio Corp.	W2MT
millivolt output source (detector simulator)	Power Design	50150A (using a 100 x 1 attenuator)

CHAPTER 2
INSTALLATION

2-1. INTRODUCTION. This chapter contains information needed to install the receiver. Section I provides the data required for effective installation planning. Section II lists all parts supplied and provides logistics data. Section III contains the installation procedures, including references to tests and adjustments required to make the receiver operational. Section IV describes the procedures to be followed when reshipping the receiver.

SECTION I
INSTALLATION PLANNING

2-2. LOCATION.

2-3. The receiver is designed for installation in a standard 19-inch relay rack, and requires 3-1/2 inches of space in the rack. The receiver should be located as near to the receiving antenna(s) as possible, and should be situated in the rack so that all indicators are visible and all front panel controls are readily accessible for adjustment during operation.

2-4. ENVIRONMENTAL CONSIDERATIONS.

2-5. The limits of environmental conditions for the receiver are listed in table 1-2 of Chapter 1.

2-6. INSTALLATION DATA.

2-7. GENERAL. The installation of the receiver depends upon the location of the antenna and the related equipment with which the receiver is going to be used. Detailed installation instructions will be determined by the using activity; however, the following information can be used as a guide. The installation drawing (figure 2-1) shows the outline and mounting dimensions of the receiver.

2-8. CABLING. Refer to table 2-1 for a listing of the external cable and wiring connections required to mate with the receiver connections. Sufficient length of cables should be allowed so that the cables at the rear of the receiver do not restrict the removal of the receiver from its rack for servicing.

2-9. GROUNDING. No special grounding procedures are required since the receiver is grounded by the ground connection of the three-wire input power plug and cable.

2-10. TIE-IN TO AUXILIARY EQUIPMENT. Three sets of contacts of carrier operated relay K2 are wired to terminal board TB1 at the rear of the receiver. These connections are to be used for the control of external equipment, as desired by the using activity. The contacts of the carrier operated relay are rated for 2 amperes at 230 volts ac or 28 volts dc. The output of the audio transformer T2 is also wired to the terminal board and may be connected as desired. Refer to figure 6-1 of the circuit diagrams section of this publication for the wiring diagram of the terminal board.

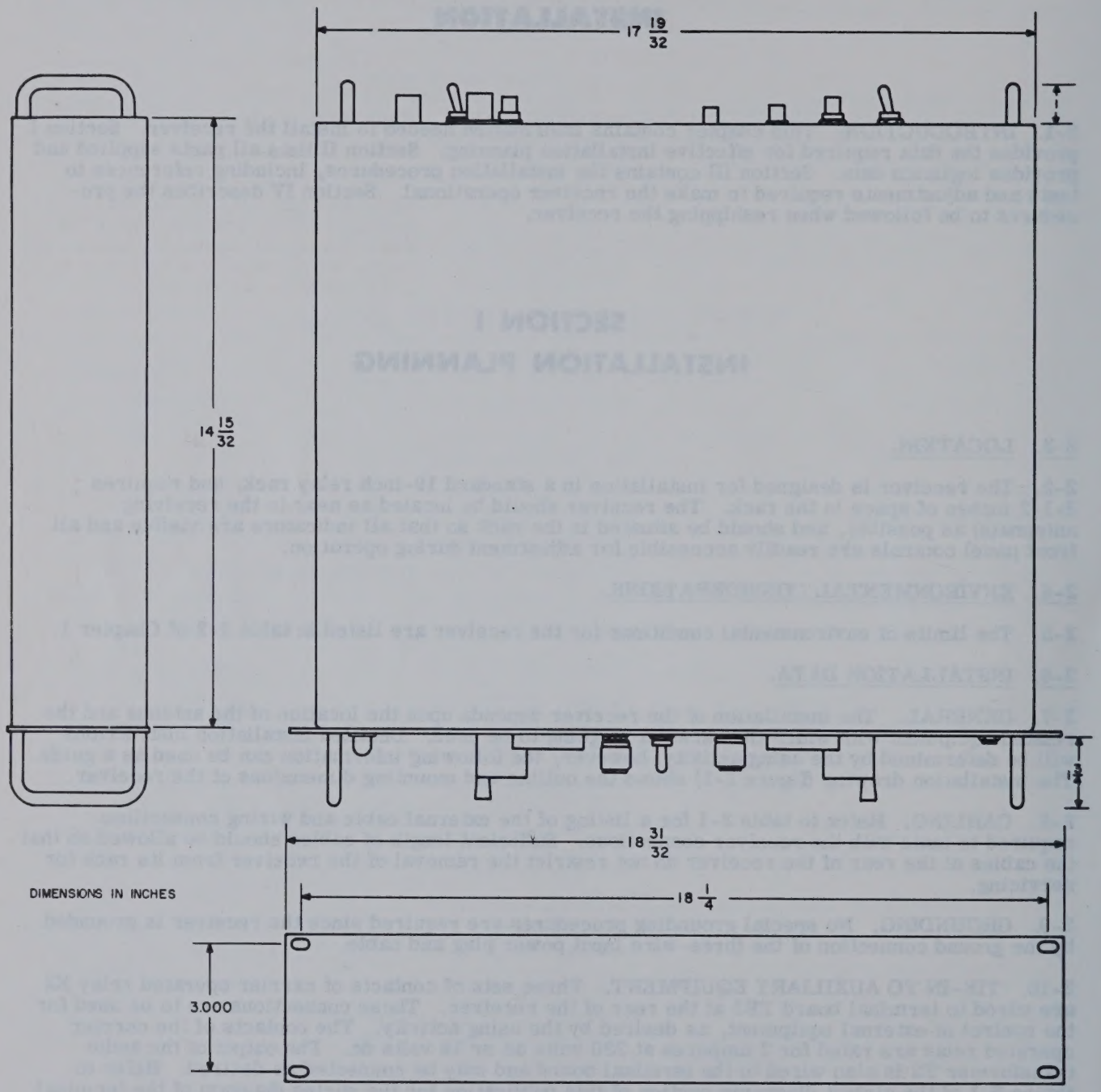


Figure 2-1. Receiver Outline and Mounting Dimensions

Table 2-1. Input and Output Connections

Connection	Nomenclature	Mating Connection
P2	Input power plug	Standard 3-wire receptacle
K1J1	ANTENNA 1	Type N, male
J4	ANTENNA 2	Type N, male
J1	PIU OUTPUT	Type BNC, male
J2	VID OUTPUT	Type BNC, male
J5	PHONE	600-ohm headset plug
TB1	Terminal board	Wiring, as required, to control external equipment by the carrier operated relay, and to connect the audio output, as desired. Relay contacts are rated at 2 amperes at 230 volts ac or 28 volts dc.

SECTION II
LOGISTICS

2-11. RECEIVING DATA. Table 2-2 gives the receiving data in the form of crated and uncrated dimensions and weights of the equipment supplied as it is shipped. Table 2-3 lists the contents of the container in which the receiver is shipped. The shipping container and packing materials should be retained for use when storing or reshipping the receiver.

Table 2-2. Receiving Data

Dimensions	
Crated	(See Note)
Uncrated	19 by 17-1/2 by 3-1/2 inches
Weight	
Crated	(See Note)
Uncrated	28 pounds (estimated maximum)

Note: Crated dimensions and weight vary with shipment destination and spares requirements.

Table 2-3. Shipping Container Contents

Unit	Quantity
Receiver, Radio, R-1283/GRC	1
Power plug adapter	1
Instruction manuals	2 sets
Envelope, containing shipping address, name of equipment, and purchase order number.	1

2-12. CABLE REQUIREMENTS. The cabling of table 2-1 must be accomplished. The input power cable and connector and the power plug adapter are supplied with the receiver. The PIU OUTPUT cable is supplied with the Panoramic Indicator IP-805/GRC. All other cables must be fabricated locally.

SECTION III
INSTALLATION PROCEDURES

2-13. INSTALLATION PROCEDURE. After the receiver is unpacked and inspected for damage that might have occurred during shipment, the cables should be connected, the receiver should be installed in the rack, and the operation of the receiver should be checked. To install the receiver, proceed as follows:

a. Install the receiver in its rack and secure it using the mounting hardware.

b. Connect the power cable connector P2 to the 115-volt, 60-cps, ac power source.

c. Make all other connections listed in table 2-1 as required for the desired operation.

d. Perform the operating procedures of paragraphs 3-3 through 3-5.

e. Perform the operational checkout procedure of Chapter 5.

SECTION IV
PREPARATION FOR RESHIPMENT

2-14. PACKING. The shipping container and all packing material (retained during unpacking) should be used when reshipping or storing the receiver. No special instructions are required, except that the cables should be disconnected from the receiver, the receiver should be carefully removed from its rack, and the receiver should be packed so that it is protected against damage that might occur during storage or transit.

CHAPTER 3
OPERATION

3-1. INTRODUCTION. This chapter contains information and procedures needed to operate the receiver properly. Section I contains illustrations of the receiver controls and indicators and tables which explain the functions of the controls and indicators. Section II gives the starting, operating, and stopping procedures for the receiver. Section III provides the instructions for operating the receiver when a partial failure of the receiver circuitry occurs.

SECTION I
CONTROLS AND INDICATORS

3-2. RECEIVER CONTROLS AND INDICATORS. The controls and indicators used to operate the receiver which are located on the front panel are shown in figure 3-1 and their functions are given in table 3-1. The controls and connections located on the rear panel of the receiver are shown in figure 3-2 and their functions are given in table 3-2.

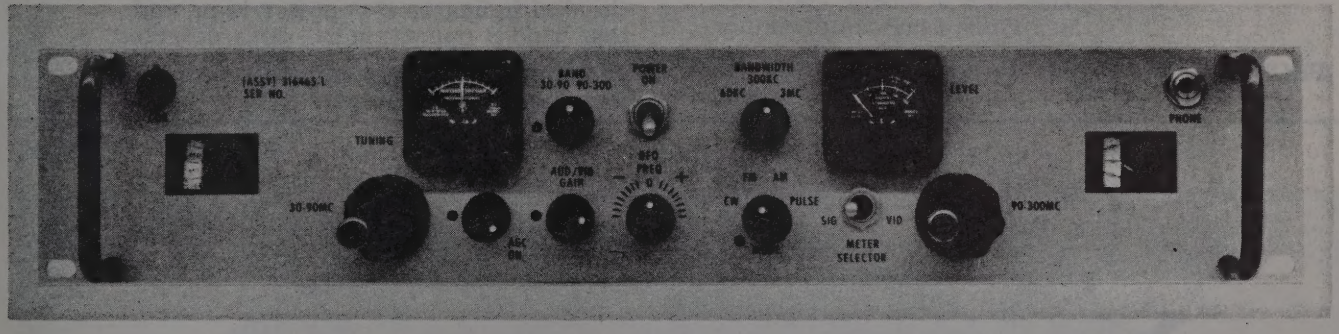


Figure 3-1. Front Panel Controls and Indicators

Table 3-1. Front Panel Controls and Indicators (Sheet 1 of 2)

Name	Reference Designation	Function
COR	DS1	Comes on to indicate that receiver i-f contains a carrier signal.
30-90 MC	A1	Band A tuner control and dial used to select the input signal frequency during band A operation. The illumination of the dial indicates that power is on and that band A operation has been selected.
TUNING	M1	Indicates deviation from optimum tuning.
BAND	S3	Used to select the frequency range desired; selects band A when set to 30-90, and band B when set to 90-300.

Table 3-1. Front Panel Controls and Indicators (Sheet 2 of 2)

Name	Reference Designation	Function
POWER	S5	Controls the application of primary power to the receiver.
BANDWIDTH	A10S1	Selects the bandwidth of the output signal; also disables carrier operated relay K2 when 3-Mc bandwidth is selected.
IF GAIN	R3/S6	Potentiometer R3 provides manual control of gain; when R3 is set fully clockwise to AGC ON position, switch S6 connects agc circuitry.
AUD/VID GAIN	R2B/R2A	Controls output levels of audio and video signals.
BFO FREQ	R1	Adjusts frequency of beat frequency oscillator for cw reception.
MODE	S4	Selects PULSE, AM, FM, or CW mode of operation.
METER SELECTOR	S8	Connects agc or detected video signal to LEVEL meter.
LEVEL	M2	Indicates relative signal strength (agc voltage) or video level.
90-300 MC	A2	Band B tuner control and dial used to select the input signal frequency during band B operation. The illumination of the dial indicates that power is on and that band B operation has been selected.
PHONE	J5	Jack used to connect earphones for monitoring audio output.

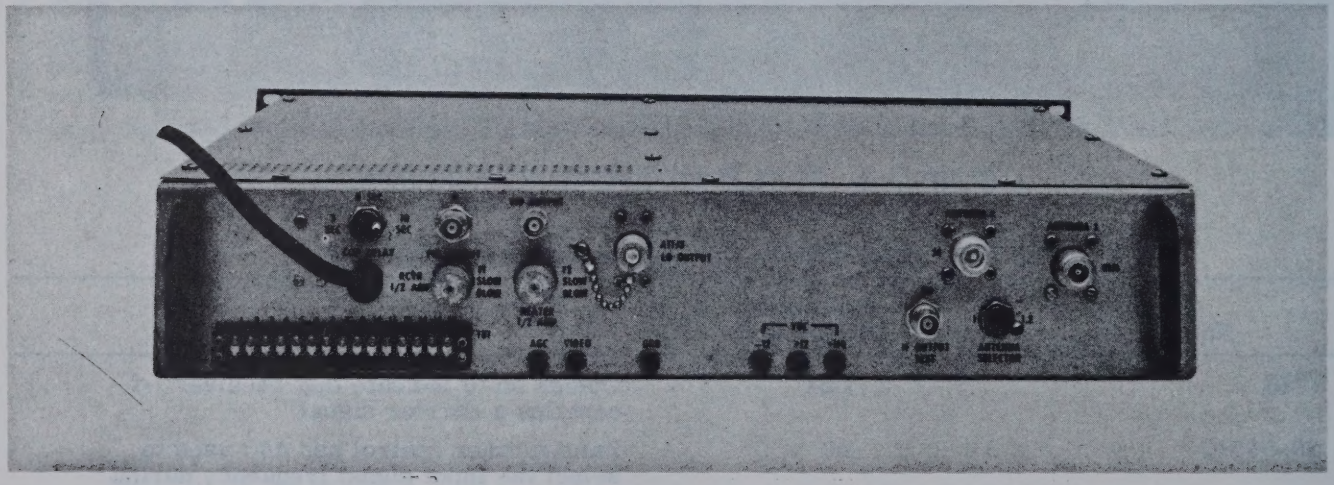


Figure 3-2. Rear Panel Controls and Connectors

Table 3-2. Rear Panel Controls and Connectors

Name	Reference Designation	Function
COR DELAY	S7	Used to select drop-out delay time (0, 3, or 10 seconds) of carrier operated relay.
PIU OUTPUT	J1	Connector used to connect 21.4-Mc i-f output to Panoramic Indicator.
VID OUTPUT	J2	Connector used to connect video output to external equipment.
RCVR 1/2 AMP SLOW BLOW	F1	Fuse protecting the power supply transformer circuit.
HEATER 1/2 AMP SLOW BLOW	F2	Fuse protecting heater control circuitry.
LO OUTPUT	AT1J3	Test connection provides output of local oscillator of tuner that is energized.
ANTENNA 1	K1J1	Used to connect antenna normally associated with band B to band B tuner; can be used for bands A and B.
ANTENNA 2	J4	Used to connect antenna normally associated with band A to band A tuner.
Terminal Strip	TB1	Provides means of connecting 3 sets of contacts of carrier operated relay K2 for control of auxiliary equipment; also provides means of connecting audio output to external equipment.
AGC	J6	Test point used for checking agc voltage derived from IF GAIN control or from agc detector output.
VIDEO	J7	Test point used to monitor or inject a test video signal into the video amplifier circuitry.
GRD	J8	Provides ground connection for testing purposes.
-12 VDC	J9	Test point for checking -12 volt dc output of power supply.
+12 VDC	J10	Test point for checking +12 volt dc output of power supply.
+110 VDC	J11	Test point for checking +110 volt dc output of power supply.
IF OUTPUT TEST	J18	Test point for checking output of i-f amplifier as it is fed to limiter before limiting stages.
ANTENNA SELECTOR	S2	Switch used to control operation of receiver using one antenna.

SECTION II
OPERATING INSTRUCTIONS

3-3. PREOPERATIONAL CHECKS. The following items should be checked before operation of the receiver is begun:

a. Check that the power connector P2 is connected to the 115-volt, 60-cps, ac power source.

b. Check that antennas 1 and 2 are connected to ANTENNA 1 K1J1 jack and ANTENNA 2 J4 jack, respectively. If only one antenna is to be used, make certain that it is connected at the ANTENNA 1 K1J1 jack and that ANTENNA SELECTOR switch S2 at the rear panel is set to 1. When band A operation is then selected, coaxial switch K1 will connect the antenna to the band A tuner, and when band B operation is selected, the coaxial switch will connect the antenna to the band B tuner.

c. Check that the COR DELAY switch S7 on the rear panel is set to 0 SEC, 3 SEC, or 10 SEC, as desired, to control the drop-out time of the carrier operated relay K2.

d. Check that the desired connections are made at the following points:

(1) PIU OUTPUT connector J1

(2) VID OUTPUT connector J2

(3) PHONE jack J5

(4) the audio output at TB1-13, -14, and -15.

(5) any control circuits of auxiliary equipment at TB-1 through -8.

3-4. STARTING PROCEDURE.

a. Set the POWER switch to ON.

b. Set the BAND selector switch to the desired band of operation (30-90 or 90-300 position) and check that the tuner dial of the band selected is illuminated.

NOTE

The illumination of the dial indicates that power is on and that the tuner with the illuminated dial is energized.

c. Set the tuning control of the band selected (either the 30-90MC or the 90-300MC control) to the desired frequency, as indicated by the tuner dial.

NOTE

Fine tuning to the exact frequency is not required at this point.

d. Set the MODE selector switch to the desired mode of operation (PULSE, AM, FM, or CW).

e. Set the BANDWIDTH selector switch to the desired bandwidth (60KC, 300KC, or 3MC).

f. Set the IF GAIN control fully clockwise to the AGC ON position.

g. Set the AUD/VID GAIN control fully clockwise for maximum gain.

h. Set the BFO FREQ control to 0.

i. Set the METER SELECTOR switch to SIG or VID, as desired.

j. Allow a 45-minute warm-up period for the local oscillator to fully stabilize before precise tracking.

3-5. OPERATING PROCEDURE.

a. After the 45-minute warm-up period, set the tuning control as required for optimum tuning, as indicated by the TUNING indicator.

NOTE

If the selected bandwidth is 60 or 300 kc, the COR indicator light will come on and go off as the receiver is tuned. This is a normal indication brought about by the receiver detecting carriers as it is tuned.

b. If cw reception is the mode of operation selected, adjust the BFO FREQ control until a suitable output is obtained.

c. If automatic gain control is not selected in the starting procedure, adjust the IF GAIN control for the desired signal level.

NOTE

To prevent overloading the receiver, it is recommended that the IF GAIN control be set to the AGC ON position and left at that setting; for control of the output signal level, use the AUD/VID GAIN control.

d. Adjust the AUD/VID GAIN control as required for the desired output.

NOTE

The LEVEL meter can be used to provide an indication of a predetermined desired output level when adjusting the AUD/VID GAIN control.

e. When scanning the frequency range of the band selected, the 45-minute warm-up period is not required; in this case, a 5-minute stabilization period is sufficient.

f. If it is desired to change the band of operation, a sufficient stabilization period should be allowed for the local oscillator of the selected tuner.

g. If it is desired to change bandwidths during operation, it is recommended that the 300-kc bandwidth be used as an intermediate step when changing from wide-band to narrow-band operation; the receiver should be tuned to the desired frequency with the BANDWIDTH switch set to 300KC before selecting narrow-band operation.

3-6. STOPPING PROCEDURE. To stop the operation of the receiver, set the POWER switch to its off position.

SECTION III
EMERGENCY OPERATION

3-7. OPERATION DURING PARTIAL EQUIPMENT FAILURE. When any breakdown occurs, it is advisable and recommended to turn off the receiver and to repair the defect immediately. In some instances, however, operation of the receiver can be continued on a limited basis, despite the breakdown. The following suggestions of paragraphs 3-8 through 3-14 can be helpful in keeping the receiver operational when a partial failure is experienced.

3-8. TUNER FAILURE. If one tuner becomes inoperative, operation of the receiver can be continued using the other tuner.

3-9. COMBINING AMPLIFIER FAILURE. If relay K1 of the combining amplifier is inoperative (the output of band B tuner is not connected to the receiver circuitry during band B operation), the output cable connector of tuner B can be connected in the place of the output cable connector of tuner A, and band B operation can then be continued.

3-10. LIMITER FAILURE. Failure of the a-m detector of the limiter will prohibit using the receiver in the pulse or a-m mode of operation. Failure of the agc detector will require manual control of gain using the IF GAIN control. Failure of the limiter stages will disable the carrier operated relay, the TUNING indicator, and the fm mode of operation.

3-11. DISCRIMINATOR FAILURE. Failure of any of the fm discriminators will prohibit fm operation in the corresponding bandwidth. Failure of the fm amplifier will prohibit all fm operation.

3-12. COR/AUDIO AMPLIFIER FAILURE. Failure of the cor portion of the amplifier will disable the carrier operated relay. Failure of the audio amplifier will cause a lack of the audio output.

3-13. BEAT FREQUENCY OSCILLATOR FAILURE. Failure of the bfo portion will prohibit the cw mode of operation. Failure of the pulse generator section will disable the carrier operated relay.

3-14. AGC AMPLIFIER FAILURE. Failure of amplifiers Q1, Q2, and Q9 and associated circuitry will prohibit the use of the agc; manual gain control, using the IF GAIN potentiometer, must then be used.

CHAPTER 4
PRINCIPLES OF OPERATION

4-1. INTRODUCTION. This chapter contains the principles of operation of the receiver. Section I contains a functional system block diagram discussion of the receiver. Section II describes how each electronic unit within the receiver operates, and Section III explains the mechanical operation of the tuner drive assemblies of the receiver. Basic theory of operation of circuits is not included; for basic circuit principles of operation, refer to T.O. 31-1-141.

SECTION I
FUNCTIONAL SYSTEM OPERATION

4-2. INITIAL POWER TURN-ON. When the POWER switch is set to ON, the power supply is energized to provide the operating voltages required by the subassemblies of the receiver (see figure 4-1). The filaments of the tubes used in the tuners are energized, and the tuner heater control circuitry is energized to maintain the temperature of both tuners at about 50°C (see figure 4-2).

4-3. BAND SELECTION. The setting of the BAND switch determines which tuner is energized. The output of the tuner selected is then connected to the remainder of the receiver circuitry (see figure 4-3). Normally, antenna 2 is connected to the band A tuner and antenna 1 is connected to the band B tuner; however, if only one antenna is used with the receiver, the BAND switch and the ANTENNA SELECTOR switch control a coaxial switch which connects the antenna to the tuner that is energized.

4-4. TUNER OPERATION. In the tuner that is energized, the tuned input signal is amplified and mixed with the local oscillator signal to produce the 21.4-Mc i-f output. The i-f signal is fed to the combining amplifier, where it is amplified before it is applied to the bandwidth selector unit. Before amplification, however, an i-f output for the Panoramic Indicator is made available at the PIU OUTPUT jack J1, located on the rear panel of the receiver. The local oscillator signal is made available for test purposes at the LO OUTPUT jack AT1J3, which is also located on the rear panel. This output is derived from the local oscillator output unit AT1.

4-5. BANDWIDTH SELECTION. The bandwidth selector unit contains an attenuator network and a rotary selector switch. When the BANDWIDTH switch is set to the desired position, the internal 3-Mc attenuator network, or the external 300-kc or 60-kc bandwidth filters are inserted in the signal path between the combining amplifier output and the i-f amplifier input.

4-6. I-F AMPLIFICATION. The i-f amplifier is a 5-stage, stagger-tuned amplifier with a buffer stage. This amplifier provides a maximum of 75-db gain with agc set for maximum gain. The output of the buffer stage is applied to the limiter unit.

4-7. LIMITER OPERATION. In the limiter, the i-f signal is amplified and the amplified signal is: (1) brought out at the IF OUTPUT TEST jack J18 at the rear panel of the receiver; (2) detected for the a-m signal, which is applied to the PULSE and AM contacts of the MODE selector switch; (3) detected for an agc signal, which is biased by the diode bias input from the agc amplifier; and (4) applied to two stages of limiting. The limited output is coupled to the beat frequency oscillator unit by the COR SIG LEVEL adjustment capacitor C23. This output is fed through the 500-kc filter, which eliminates wide-band noise. The output of the limiter stages is also amplified and applied to the discriminator unit.

4-8. DISCRIMINATOR OPERATION. The limiter amplified output signal is applied to the 3-Mc, 300-kc, and 60-kc fm discriminators. The discriminators produce outputs which are used during the fm mode of operation. The discriminator output selected by the BANDWIDTH selector switch (3 Mc,

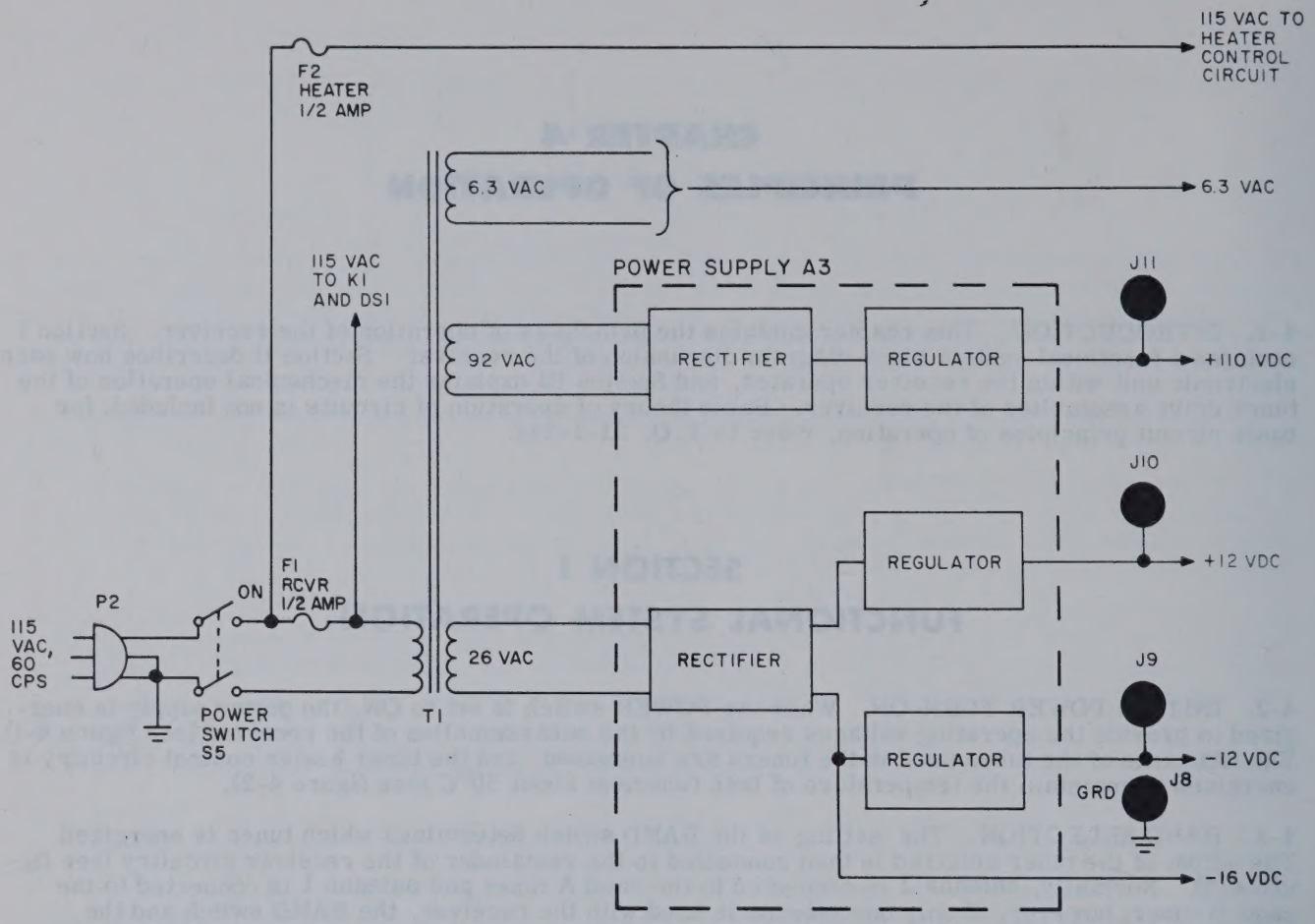


Figure 4-1. Power Supply, Functional Block Diagram

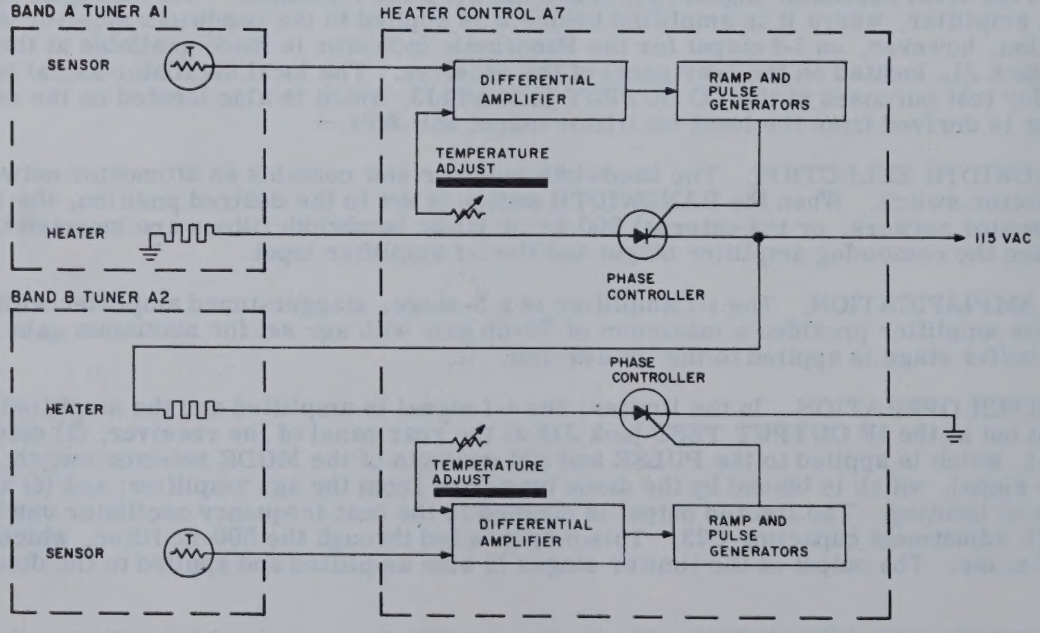


Figure 4-2. Heater Control, Functional Block Diagram

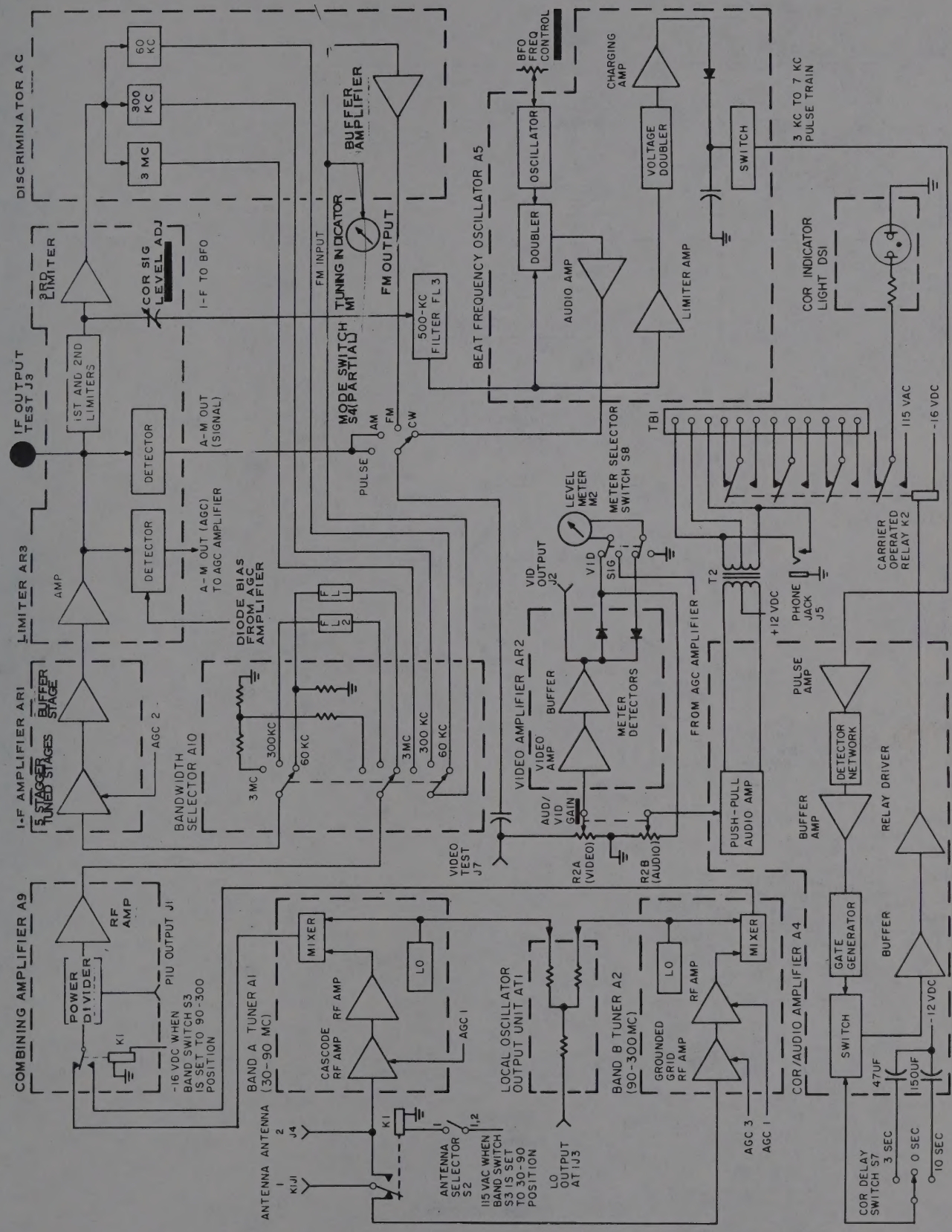


Figure 4-3. Receiver Signal Circuitry, Functional Block Diagram

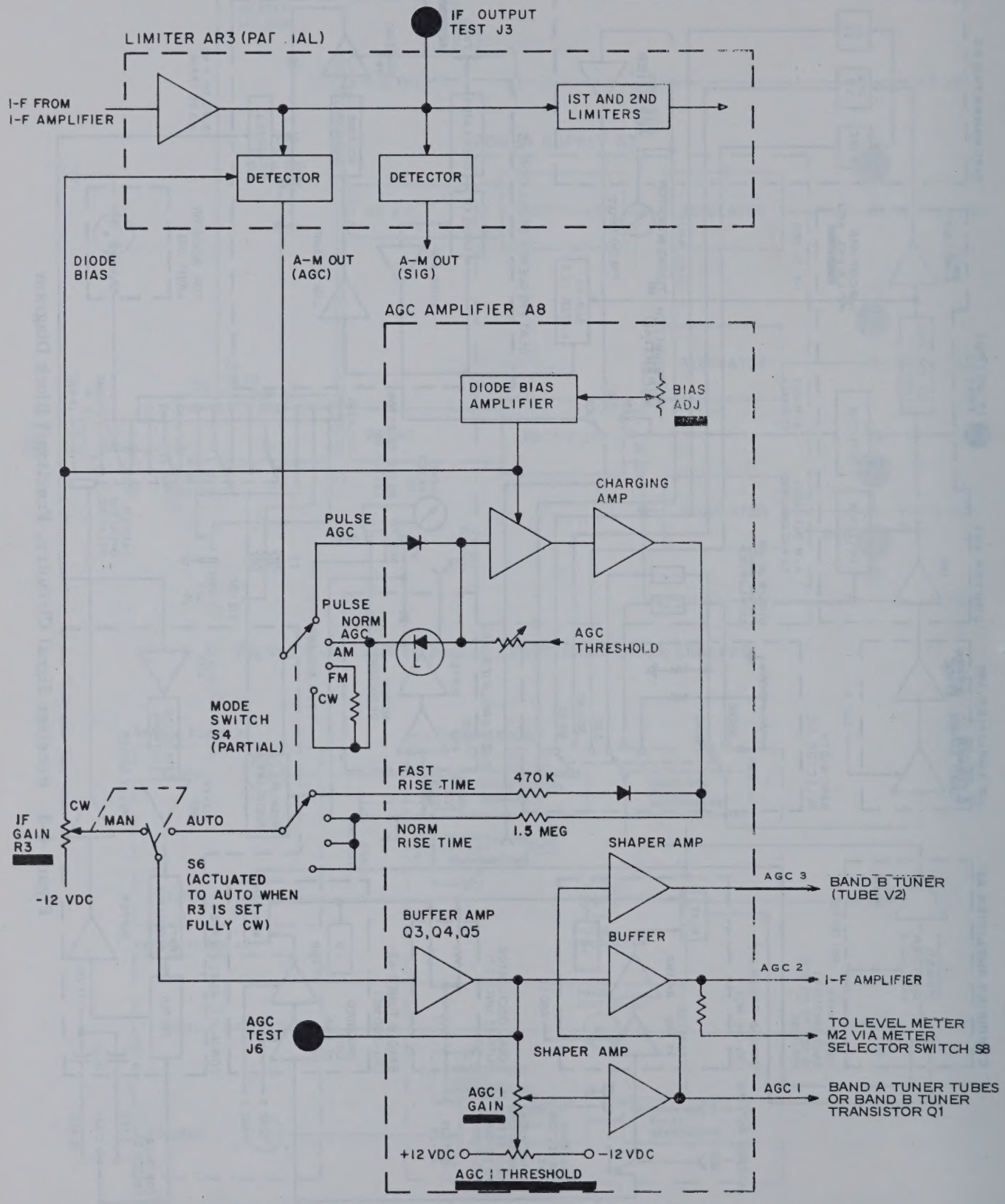


Figure 4-4. Gain Control Circuitry, Functional Block Diagram

300 kc, or 60 kc) is applied to the fm buffer amplifier in the discriminator unit. This amplified fm output is then applied to the FM contact of the MODE selector switch. The TUNNING indicator is connected at the input of the fm buffer amplifier and provides an indication of the deviation from optimum tuning.

4-9. BEAT FREQUENCY OSCILLATOR UNIT OPERATION. The signal coupled out of the limiter by the COR SIG LEVEL capacitor is fed to the beat frequency oscillator unit through the 500-kc filter. The filter eliminates wide-band noise. The beat frequency oscillator unit is divided into two separate circuits, the audio converter and the cor pulse generator.

4-10. The audio portion of the beat frequency oscillator is energized only when the cw mode of operation is selected. When the oscillator, doubler, and audio amplifier are energized, the circuit produces an audio output corresponding to the cw input. The oscillator frequency can be varied using the BFO FREQ control on the front panel to produce the audio output applied to the CW contact of the MODE selector switch.

4-11. The cor pulse generator of the beat frequency oscillator unit functions to provide a pulse train to the cor/audio amplifier whenever a carrier is present in the receiver i-f. The cor pulse generator section is energized only when the BANDWIDTH switch is set to 300KC or 60KC; the cor pulse generator is disabled during 3-MC bandwidth operation. The cor pulse generator circuit functions to convert the limited 21.4-Mc i-f to a 7-kc (maximum) pulse train, the prf being determined by the input carrier level.

4-12. MODE SELECTION. The signal applied to the video gain control potentiometer R2B (one-half of the AUD/VID GAIN control on the front panel) is determined by the setting of the MODE selector switch. When this switch is set to PULSE or AM, the output of the signal detector in the limiter is applied to the video gain potentiometer. When the switch is set to FM, the output of the fm buffer amplifier of the discriminator is applied to the potentiometer, and when the switch is set to CW, the output of the audio amplifier in the beat frequency oscillator unit is applied to the potentiometer. The MODE selector switch also selects the gain control time constants required for pulse, a-m, fm, and cw reception, and energizes the audio section of the beat frequency oscillator unit during cw reception.

4-13. VIDEO AMPLIFIER OPERATION. The signal picked off by the video gain potentiometer wiper arm is applied to the video amplifier, where it is amplified, and also rectified. The amplified output is brought out to the VID OUTPUT jack J2 on the rear panel; the rectified output is applied to the LEVEL meter M2 when the METER SELECTOR switch is set to VID. The amplified output of the video amplifier is also applied to the audio gain potentiometer R2A (one-half of the AUD/VID GAIN control).

4-14. COR/AUDIO AMPLIFIER OPERATION. The signal picked off by the audio gain potentiometer wiper arm is applied to a push-pull audio amplifier of the cor/audio amplifier. The output of the push-pull amplifier drives the audio transformer T2. The transformer output is brought out to terminal board TB1, which is located on the rear panel of the receiver, and to the PHONE jack, which is located on the front panel of the receiver.

4-15. The cor section of the cor/audio amplifier consists of a pulse amplifier and detector controlling a Schmitt trigger. The Schmitt trigger, in turn, controls the operation of the carrier operated relay K2. This trigger circuit is turned on only

when a pulse train over a certain prf is received from the beat frequency oscillator unit, indicating that a carrier is present in the receiver i-f. The COR DELAY switch on the rear panel provides a selection of 0, 3, or 10 seconds delay before the carrier operated relay drops out after the carrier ceases. The carrier operated relay is provided to control auxiliary equipment.

4-16. GAIN CONTROL. Gain control voltages for the tubes and transistors of the tuners and for the i-f amplifier stages are derived from the agc amplifier (see figure 4-4). The input of the agc detector of the limiter during automatic control of gain. The gain control time constrants for pulse, a-m, fm, and cw operation are selected by the MODE selector switch.

SECTION II
FUNCTIONAL OPERATION OF ELECTRONIC CIRCUITS

4-17. INPUT POWER CIRCUIT. The external 115-volt 60-cps, ac power source is connected to the receiver circuitry by the power cable and connector P2 (see figure 6-1). When the POWER switch S5 is set to ON, 115 volts is applied to the BAND selector switch S3 for control of the antenna selector relay K1, to the primary windings of transformer T1, and to the COR indicator light DS1, via relay K2 through RCVR fuse F1. The 115 volts is also applied to the heater control circuitry through HEATER fuse F2. The secondary windings of transformer T1 supply 6.3-volt ac to the tuners for heater filament voltage, and 26-volt and 92-volt ac power to the power supply. The 6.3-volt ac is also applied to the BAND selector switch S3 to energize the dial indicator light of the tuner that is selected by the switch.

4-18. POWER SUPPLY. In the power supply (see figure 6-2), the 92-volt ac is applied to full-wave bridge rectifier CR1 through CR4, to produce a dc output of about 130 volts. The 130-volt output is applied to the collector of pass amplifier Q1. Zener diode CR5, located in the base circuit of Q1, together with resistor R1, provide the fixed collector-to-base bias required for Q1 to supply the regulated +110-volt dc output at its emitter.

4-19. The 26 volts ac from transformer T1 is applied to full-wave rectifiers CR6 and CR8 to produce the regulated +12 volts dc, and to full-wave rectifiers CR7 and CR9 to produce the regulated -12 volts and the unregulated -16 volts dc. The regulation of the +12 volts is accomplished by common-collector pass transistors Q2 and Q3, with transistor Q4 as the feedback dc amplifier for Q2 and Q3. Transistor Q4 receives its reference voltage from zener diode CR10, located on the emitter of Q4. The regulated voltage output level is set by the +12 ADJ potentiometer R6, which is located in the base circuit of Q4. Regulation of the -12 volts dc is accomplished in an identical manner.

4-20. The unregulated -16 volts dc is taken off at the output of rectifiers CR7 and CR9. This voltage is used to energize the carrier operated relay K2 and the combining amplifier relay A9K1. The carrier operated relay is controlled by the cor section of the cor/audio amplifier and the combining amplifier relay is controlled by the MODE selector switch.

4-21. The -12 volts, +12 volts, and +110 volts dc are brought out through isolating resistors to test jacks (J9, J10 and J11, respectively) on the rear panel of the receiver. A ground test point jack (J8) is also located on the receiver rear panel.

4-22. HEATER CONTROL BOARD A7. To provide tuning stability, each tuner is enclosed in an "oven" which contains a heater element. A temperature-sensing thermistor is also located in each tuner and provides an output to the heater control unit that is used to control the voltage applied to the heater element. The heater control circuitry is energized by the 115-volt ac power when the POWER switch is set to ON. Both tuners are heated during operation, regardless of which tuner is energized to supply the input signal to the receiver. The heater control circuitry is protected by the HEATER fuse F2.

4-23. Thermistor RT1 of tuner A is connected in a voltage divider network which includes the temperature adjustment potentiometer R3 of the heater control unit (see figure 6-3). The adjustment potentiometer is set so that when the temperature of the tuner is at about 50°C, the pulsating potential at the base of transistor Q1 is

the same as the potential at the base of transistor Q2. Transistors Q1 and Q2 are connected as a differential amplifier which provides a pulsating output to ramp generator Q3 when the temperature of the tuner drops below 50°C. The drop in temperature causes a change in the resistance of RT1, which, in turn, causes a change in the voltage potential at the base of transistor Q1. Transistor Q1 is then turned on, causing transistor Q2 to conduct, since the emitter-to-base potential of Q2 is changed by Q1 conducting.

4-24. When transistor Q2 is turned on, ramp generator Q3 conducts, charging capacitor C1 during the pulse interval. The ramp generator provides the timing required for the phase control of the heater element voltage. When capacitor C1 is charged sufficiently positive, pulse generator Q4 will conduct, producing a bias voltage that is applied to phase controller Q5, a silicon-controlled rectifier. The silicon-controlled rectifier is connected between the 115-volt ac power input and the heater element. When the bias voltage is applied to the silicon-controlled rectifier, the 115-volt ac is gated to the heater element. The amount of 115-volt ac gated to the heater is proportional to the temperature deviation, since the ramp slope will vary with the voltage deviation caused by the temperature deviation. When the tuner oven is heated to the required temperature, the thermistor together with the electronic circuitry and heater will operate with feedback to maintain the temperature constant. The amount of 115-volt ac gated to the heater element after warmup will be constant and will change only with changes in the outside ambient temperature.

4-25. The heater control circuitry for tuner B is identical with the tuner A heater control circuitry, except for the connection of the 115 volts ac. The 115 volts ac is connected so that the positive half-cycle of the ac is used for one heater and its control circuitry, while the negative half-cycle of the ac is used for the other heater and its control circuitry.

4-26. BAND A TUNER A1. The input signal to tuner A is applied to input plug A1P2 of the tuner from the ANTENNA 1 connector K1J1 when one antenna is used; however, if two antennas are used with the receiver, the input signal is applied from the ANTENNA 2 connector J4.

4-27. When band A tuner operation is selected by the BAND switch, 6.3 volts ac is applied to the tuner dial illuminating light, +110 volts dc is applied to the tube circuitry as B+ voltage, and +12 volts dc is applied to the transistor circuitry via the BAND switch contacts. In addition, the agc 1 voltage is applied to the tubes of tuner A vis the BAND switch contacts.

4-28. The frequency of the signal applied to the grid of tube V1 is determined by the setting of the tuner A 30-90MC control and indicated on the tuner dial. The tuner control consists of ganged variable inductors L1A through L1E and L1G, which tune the various stages of the tuner (see figure 6-4). Tubes V1 and V2 are connected in a cascode arrangement and provide an input stage with high gain and low noise figure. The output of tube V2 is further amplified by rf amplifier Q1 before it is applied to mixer stage Q2. The local oscillator stage Q3 provides a signal 21.4 Mc above the input signal frequency and its output is also applied to mixer stage Q2. The two inputs to the mixer stage produce the 21.4 Mc i-f output, which is fed to the combining amplifier via connector A1P3. The local oscillator signal is made available for test purposes to the local oscillator output unit AT1 through connector A1P4.

4-29. To provide local oscillator frequency stability, heater A1HR1 and temperature sensor A1RT1 of the tuner function with the heater control board A7 to maintain tuner temperature at 49°C. Both tuners are heated when the receiver is energized (POWER switch is set to ON), regardless of which tuner is selected for operation.

4-30. BAND B TUNER A2. The input signal to tuner B is applied from the ANTENNA 1 connector K1J1 to input plug A2P2 via the normally closed contacts of de-energized relay K1. When band B operation is selected by the BAND switch, 6.3 volts ac is applied to the tuner dial illuminating light, +11- volts dc is applied as B+ voltage to tubes V1 and V2, and +12 volts dc is applied to transistors Q1, Q2, and Q3 circuitry via the BAND switch contacts. In addition, the agc 1 voltage is applied to the rf amplifier Q1, and the agc 3 voltage is applied to tube V2 via the BAND switch contacts.

4-31. The input signal applied from the input plug A2P2 to the cathode of grounded-grid amplifier V1 is tuned to the desired frequency in the 90 to 300 Mc range by the tuner B 90-300MC control and is indicated on the tuner dial. The tuner control consists of ganged variable inductor L1A through L1G, which tune the various stages of the tuner (see figure 6-5). Inductor L1A and variable capacitor C3 tune the input to tuve V1. The selected input signal is amplified in grounded-grid amplifiers V1 and V2, and then applied to rf amplifier Q1. The local oscillator stage Q3 provides an output signal 21.4 Mc above the selected input signal frequency, and its output, together with the output of rf amplifier Q1, is applied to mixer Q2 to produce the 21.4-Mc i-f signal which is fed to the combining amplifier via connector A2P3. The local oscillator signal is made available for test purposes to the local oscillator output unit AT1 through connector A2P4.

4-32. Heater A2HR1 and temperature sensor A2TR1 function with the heater control board A7 to maintain the tuner temperature at 49°C when the receiver POWER switch is set to ON.

4-33. LOCAL OSCILLATOR OUTPUT UNIT AT1. The local oscillator output unit AT1 consists of three resistors connected in a power divider configuration (see figure 6-1). The inputs to the power divider are connected to the local oscillator output connectors of the tuners; the output signal, brought out to the LO OUTPUT jack AT1J3 on the rear panel of the receiver, is the local oscillator signal of the tuner that is energized. This output has a 50-ohm impedance and is used for testing and checking purposes.

4-34. COMBINING AMPLIFIER A9. The combining amplifier A9 functions to connect the i-f output of the selected tuner to the remainder of the receiver circuitry (see figure 6-6). This i-f signal is then supplied as an output from the combining amplifier to the Panoramic Indicator at the PIT OUTPUT jack J1, located on the rear panel of the receiver; the i-f signal is also amplified and fed out to the receiver circuitry via transistor Q1 and transformer T1.

4-35. Relay K1 of the combining amplifier is de-energized when the BAND switch S3 is set to 30-90MC. When de-energized, this relay connects the i-f output of band A tuner to the combining amplifier circuitry. When the BAND switch is set to 90-300MC, -16 volts dc is connected to the relay coil and the relay is energized. When energized, this relay connects the i-f output of the band B tuner to the combining amplifier circuitry.

4-36. The i-f from the wiper of the relay is brought out to the PIU OUTPUT jack J1 to provide an output with a 50-ohm impedance. The i-f signal is also applied to transistor Q1, the output of which is transformer coupled to the bandwidth selector unit.

4-37. BANDWIDTH SELECTOR UNIT A10. The bandwidth selector unit consists of the BANDWIDTH rotary selector switch, an attenuator pad, and a cor bandwidth sensitivity adjustment potentiometer (see figure 6-1). The BANDWIDTH switch functions to accomplish the following.

a. When set to 60KC or 300KC, it inserts filter FL1 or FL2 into the signal line between the combining amplifier output and the i-f amplifier input to provide a 60KC or 300KC i-f bandwidth; when set to 3MC, it inserts the attenuator pad into the signal line to provide a 3MC i-f bandwidth.

b. It connects to 60KC, 300KC, or 3MC fm discriminator output from the discriminator unit A6 to the TUNING error indicator M1 and the fm buffer amplifier of the discriminator unit.

c. When set to 60KC or 300KC, it applies +12 volts dc to the beat frequency oscillator unit, which energizes the cor pulse generator.

d. During band A operation, when the BANDWIDTH switch is set to 60KC or 300KC, it switches potentiometers into the corrier operated relay control circuit which determine the sensitivity of the control circuit. (One of the potentiometers is located in the bandwidth selector unit; the other is located in the beat frequency oscillator unit.)

4-38. I-F AMPLIFIER AR1. The 21.4-MC i-f signal applied to the signal input of the i-f amplifier from the bandwidth selector unit is amplified in five successive stagger-tuned amplifier stages Q1 through Q5 (see figure 6-7). Stages Q1 through Q5 are tuned for approximate center frequencies of 17, 27, 16, 5, 25.5, and 18 MC by variable inductors L2, L3, L4, L6, and L10, respectively. Agc 2 voltage is applied to the first three stages of the i-f amplifier to control the gain. The output of Q5 voltage is applied to the first three stages of the i-f amplifier to control the gain. The output of Q5 is applied to buffer amplifier Q6, and the output of Q6 is fed to the limiter unit. The output from the i-f amplifier has an overall bandwidth of 4 MC at the 3-db points and maximum gain of about 75 db.

4-39. LIMITER UNIT AR3. The i-f input to the limiter unit is applied to amplifier Q1 (see figure 6-8), and the amplifier output from Q1 is fed to the a-m detector CR5, the agc detector CR2, and the primary winding of coupling transformer T1. The a-m detector CR5 provides a dc level representative of the amplitude or pulse modulated i-f signal, and is called the a-m out (sig) signal. This signal is applied to the PULSE and AM contacts of the MODE selector switch S4. The agc detector CR2 also provides an OUTPUT representative of the amplitude of the input signal and this output signal called the a-m out (agc) signal, is applied to a second set of PULSE and AM contacts of the MODE selector switch. This output is used by the agc amplifier when automatic gain control is in operation. The agc detector reference level is determined by the diode bias applied to it from the diode bias amplifier of the agc amplifier.

4-40. The amplified output from Q1 that is applied to coupling transformer T1 is used for test purposes and is also applied to the limiter stages of the limiter. The coupling transformer has two secondary windings; one set of windings is connected to the IF OUTPUT TEST jack J3, located on the rear panel of the receiver, and provides an output which is used for checking out the i-f amplifier. With a test signal injected into the i-f amplifier (or earlier in the system, such as at the combining amplifier input or output), the system circuitry up to the limiters and detectors can be checked using this output.

4-41. The second set of secondary windings of coupling transformer T1 produces an output that is applied to limiter stages Q2 and Q3. The limiter stages remove any amplitude variations in the fm and cw signals before the signal is applied to the fm discriminators. Limiting is required to prevent adverse effects of the amplitude variations on the output of the fm discriminators. The output of Q2 is limited by diodes CR3 and CR4, which are connected back-to-back, in paralled with the primary windings of coupling transformer T2. The secondary windings of transformer T2

provide a signal which is applied to limiter stage Q3. Diodes CR6 and CR7 limit this output of Q3 in the same manner as the output of Q2 is limited. The output of Q3 is capacitor coupled to the beat frequency oscillator by variable capacitor C23, the cor signal level adjustment control. The output of Q3 is also transformer coupled to amplifier Q4, the output of which is the limited signal output applied to the discriminator unit.

4-42. DISCRIMINATOR UNIT A6. The limited signal output from the limiter unit is applied to the three fm discriminators via the signal input jack J2 of the discriminator (see figure 6-9). The 3-MC discriminator consists of two diode detectors CR1 and CR2, whose outputs are summed across the resistance divider network made up of R2 and R9. Diode detector CR1 produces a positive output while diode detector CR2 produces a negative output. The resonant circuits of the detectors are tuned by L1 and L2 to different frequencies, one above the 21.4-MC i-f and one below the 21.4-MC i-f. At 21.4 MC, the detector outputs are equal, but opposite in polarity. They therefore cancel each other at the junction of resistors R2 and R9, producing a zero output when the center frequency is 21.4 MC or when there is no frequency modulation involved. Frequency changes about the 21.4-MC center frequency will cause the summed output to go either positive or negative.

4-43. The 300-KC discriminator is operationally identical with the 3-MC discriminator, except for the bandwidth. The 60-KC discriminator is a hermetically sealed crystal discriminator which is tuned by variable inductor L5. The three outputs of the discriminators are connected to their corresponding contacts of the BANDWIDTH selector switch. Depending upon the setting of this switch, the 3-MC, 300-KC, or 60-KC discriminator output is connected, via the switch contacts, to the fm buffer amplifier Q1 of the discriminator and to the TUNING error indicator M1. The fm buffer amplifier Q1 amplifies the selected discriminator output and feeds its output to the FM contacts of the MODE selector switch S4.

4-44. BEAT FREQUENCY OSCILLATOR UNIT A5. The beat frequency oscillator contains a mixer, an oscillator, and an audio amplifier which function to convert the received cw signal into an audio tone; it also contains the cor pulse generator which functions to develop a pulse train when there is a carrier in the receiver i-f (see figure 6-10). This pulse train is used to control the carrier operated relay.

4-45. The i-f signal coupled from the limiter stages by the cor signal level adjustment capacitor C23 of the limiter is fed to the signal input jack J1 of the beat frequency oscillator unit through the 500-KC filter FL3. This filter eliminates wideband noise. This input signal applied to the mixer stage is also applied to the cor pulse generator. The mixer, oscillator, and audio amplifier are energized by -12 volts dc which is applied to the circuit only when the MODE selector switch is set to CW.

4-46. Transistor Q3 is a grounded-base variable frequency oscillator that is coarsely tuned by variable inductor L4 and finely tuned by capacitive varactor diode CR3. The local oscillator is tuned to a frequency of 10.7 MC, one-half the i-f. A dc voltage, obtained from the BFO FREQ adjustment control potentiometer R1 located on the front panel, biases varactor diode CR3, thereby changing the capacitance across the tuned circuit of the oscillator and varying the frequency. The oscillator output is capacitor coupled to frequency doubler Q4.

4-47. The cw input signal that is to be converted to an audio signal is applied to frequency doubler Q4 from the input jack J1. The oscillator output and the cw input signals are mixed in the base to emitter junction of Q4 and a difference frequency is produced. Since the collector of Q4 is tuned to 21.4 by inductor L5, the difference frequency will appear at the collector as amplitude modulation on a 21.4-MC signal. The output from the collector of Q4 is coupled to a voltage doubling

detector network composed of CR4 and CR5. Diode CR4 clamps the negative portion of the input signal to ground, thereby doubling the input to detector CR5. The detected audio output is then filtered to remove the 21.4-MC signals and the resulting audio output is applied to audio amplifier Q5. The amplified audio output from the collector of Q5 is connected to the CW contacts of the MODE selector switch and is used as the input to the video amplifier when the receiver is in the cw mode of operation.

4-48. The cor pulse generator circuit of the beat frequency oscillator functions to convert the limited 21.4-MC i-f from the limiter to a 0 to 7-KC pulse train, the prf being determined by the input carrier level (that is, the stronger the i-f, the higher the pulse rate). The limited i-f signal, coupled from the limiter to the bfo by the cor signal level capacitor C23, is applied to limiter amplifier Q1 of the beat frequency oscillator. This common emitter amplifier has its collector tuned to 21.4 MC by L1. Diodes CR1 and CR2 form a voltage doubling network, the output of which is amplified by charging amplifier Q6. The i-f frequency pulses amplified by Q6 are rectified by CR6 to charge capacitor C5 in a staircase fashion until unijunction transistor Q2 conducts. When Q2 conducts, it discharges C5. This charging and discharging continues, providing a pulse train output from Q2 to the cor/audio amplifier, as long as there is a carrier in the receiver i-f. The cor pulse generator section is energized only when the BANDWIDTH switch is set to 300KC or 60KC; it is disabled during 3-MC bandwidth operation.

4-49. VIDEO AMPLIFIER BOARD AR2. The signal selected by the setting of the MODE selector switch is applied to the AUD/VID GAIN control potentiometer R2A. Depending upon the mode selected, this signal is derived from the a-m detector of the limiter (PULSE or AM), from the fm buffer amplifier of the discriminator (FM), or from the beat frequency oscillator (CW). The signal picked off by the wiper arm of the AUD/VID GAIN control potentiometer is applied to the video amplifier (see figure 6-11). Amplifiers Q1 and Q2 are identical, except for the emitter frequency compensating capacitors C9 and C11. These amplifiers provide amplification of signals in the 75-cps to 1.5-MC frequency range.

4-50. The output of video amplifier Q2 is applied to buffer amplifier Q3. This amplifier is connected as an emitter follower to provide the buffered output that is made available at the VID OUTPUT jack J2, located on the rear panel of the receiver. This video output is also applied to meter detector diodes CR1 and CR2. These diodes provide a dc level output of the video signal to the VID contacts of the METER SELECTOR switch. When this switch is set to VID, the dc level is displayed on the db scale of the LEVEL meter. The video output of Q3 is also applied to the audio half of the AUD/VID GAIN control potentiometer R2B.

4-51. COR/AUDIO AMPLIFIER BOARD A4. The cor/audio amplifier board contains the carrier operated relay control circuit and the audio amplifier (see figure 6-12). The audio amplifier section of this board is comprised of transistors Q10 and Q11 and their associated circuitry. Transistors Q10 and Q11 are connected as a push-pull amplifier which drives the audio transformer T2. The audio output from transformer T2 is made available at terminals of terminal board TB1, which is located on the rear panel of the receiver, and at the PHONE jack J5, which is located on the front panel of the receiver.

4-52. The pulse train output from the beat frequency oscillator is applied to pulse amplifier Q1 of the cor/audio amplifier. The output of Q1 is applied to detector network CR1 and CR2, and the rectified output from CR1 is used to charge capacitor C3. The time constant of C3 and R4 is such that a minimum of about 400 pps in a constant pattern must be detected before C3 will cause Q3 and Q4 to switch. When Q2 is conducting sufficiently, gate generators Q3 and Q4 (arranged in a Schmitt trigger configuration) will be switched on. The dc level necessary to switch

this circuit is determined by the setting of the cor A sensitivity potentiometer R38 (which adjusts the level required for 60-KC bandwidth band A operation and, together with the cor sensitivity potentiometer R5 of the bandwidth selector unit A10, also adjusts the level for 300-KC bandwidth band A operation), or the setting of the cor B sensitivity potentiometer R8 (which adjusts the level required for band B operation). The different levels are required because of the differences in the noise bandwidths of the bandwidth crystal filters and the differences in the noise figures and gains of the tuners. In addition, the setting of hysteresis adjustment potentiometer R12, in the emitter circuit of gate generator Q3, determines the off-to-on signal change required to trigger the Schmitt trigger circuit.

4-53. When the Schmitt trigger circuit is turned on, switch transistor Q5 is turned on and emitter follower Q6 turns relay driver Q7 on. When relay driver Q7 is turned on, the carrier operated relay K2 is energized to control the auxiliary equipment.

4-54. When the pulse train is removed from the input of the beat frequency oscillator (no carrier in the receiver i-f), the carrier operated relay will be de-energized. Delay of the de-energizing of this relay can be achieved by switching capacitor C9 or C10 into the base circuit of buffer amplifier Q6. This is accomplished by COR DELAY switch S7, located on the rear panel of the receiver. Depending upon the setting of this switch, 3-seconds or 10-seconds delay can be obtained. This is the time required for the capacitor selected to be charged to a value sufficiently positive to stop buffer amplifier Q6 from conducting. This, in turn, turns relay driver Q7 off and de-energizes the carrier operated relay. When the COR DELAY switch is set to 0 SEC, no capacitor is switched into the base circuit of Q6 and the relay will be de-energized as soon as the loss of the carrier is detected.

4-55. AGC AMPLIFIER BOARD A8. The agc amplifier board provides the amplification and voltage shaping function for the gain control voltages (see figure 6-13). Gain control voltages are derived from either of two sources: the setting of the IF GAIN potentiometer R3 provides the manually controlled, fixed gain control voltage level, while the output of the agc detector of the limiter unit is used to obtain automatic gain control. Bias amplifier Q9, with the bias adjustment potentiometer R24 in its base circuit, determines the voltage reference level of the gain control circuits. This voltage level is applied to the agc detector of the limiter and to the emitter of agc amplifier Q1.

4-56. Transistor Q1 is a dc amplifier, the starting voltage of which is determined by the setting of the agc threshold adjustment potentiometer R1. The output of the agc detector in the limiter unit is the input to this amplifier. The output of Q1 is applied to emitter follower Q2, which drives the fast and slow time constant networks. Depending upon the setting of the MODE selector switch, the fast time constant is used for the pulse mode of operation, while the slow time constant is used for all other modes of operation.

4-57. The input to buffer amplifier Q3 is determined by switch S6. Switch S6 is controlled by the IF GAIN potentiometer. If the IF GAIN control potentiometer is set to any position other than fully clockwise, switch S6 connects the voltage picked off by the potentiometer wiper arm to Q3; if the IF GAIN control potentiometer is set fully clockwise to the AGC ON position; switch S6 connects the fast or slow time constant network output (depending upon the setting of the MODE selector switch) to Q3. Transistors Q3, Q4, and Q5 are arranged in a Darlington circuit to reduce the impedances of the time constant networks to usable impedances.

4-58. The output of Q5 is: (1) made available at the AGC test jack J6 on the rear panel of the receiver, (2) applied to emitter follower Q6 to derive the agc 2

voltage applied to the first three stages of the i-f amplifier and to the LEVEL meter M2 via the METER SELECTOR switch when the switch is set to SIG, and (3) applied to the AGC 1 GAIN potentiometer R16. The voltage level picked off by the potentiometer wiper arm is determined by the setting of the AGC 1 THRESHOLD potentiometer R18. The AGC 1 GAIN potentiometer wiper arm voltage is applied to shaper amplifier Q7 and Q8 to derive the agc 1 voltage applied to the tuner A tubes V1 and V2 or to the tuner B transistor Q1 via the BAND selector switch. Amplifiers Q6, Q7, and Q8 provide the delay characteristics required by the tuners to prevent noise figure degradation with low-level signals. In addition the output of Q8 is applied to shaper amplifier Q10 to derive the agc 3 voltage applied to tuner B tube V2.

SECTION III
FUNCTIONAL OPERATION OF MECHANICAL ASSEMBLIES

4-59. TUNER DRIVE AND INDICATOR ASSEMBLIES. The desired operating frequency of the receiver is selected by the band A tuner or band B tuner drive and indicator assemblies. Each tuner drive and indicator assembly consists of a tuner control, spiral cam, pulley drive, indicator block, and dial assembly (see figure 4-5). The spiral cam and dial assembly are mounted on the tuner shaft. Manual input to the tuner control knob, which is linked to the spiral cam through the pulley drive, drives the indicator block laterally along the horizontal axis of the dial assembly. The drive ratio between the tuner control and the tuning shaft is about 10 to 1.

4-60. The indicator block travels on guide rails mounted on a supporting bracket. The red index mark of the indicator block denotes the operating frequency on the dial assembly. A miniature lamp in the indicator block is illuminated when the particular tuner is selected for operation. Limit stops are provided on the tuner drive shaft to prevent overdriving. Upon reaching a limit stop, overdrive is indicated by belt slippage and drag on the tuner control knob.

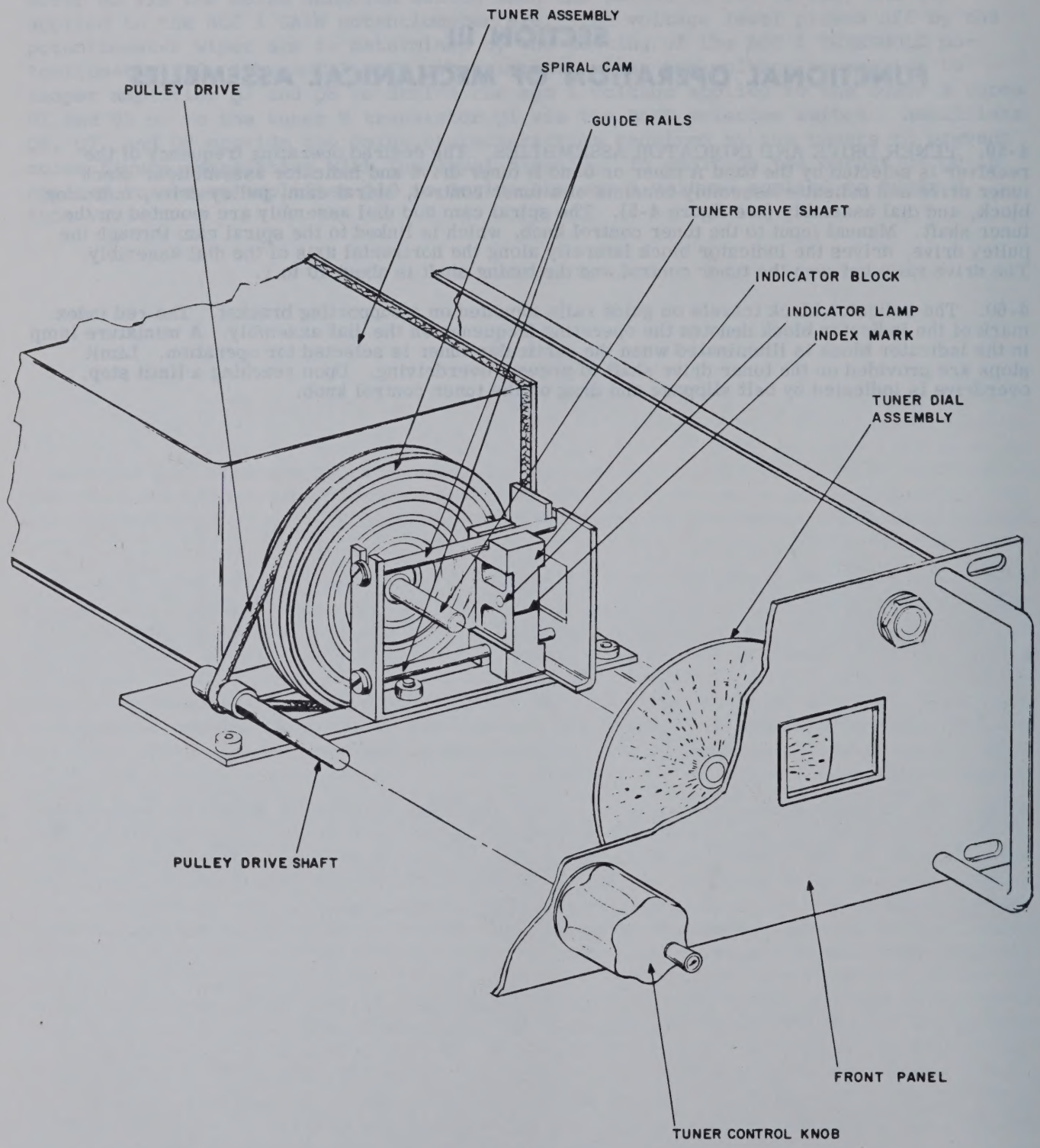


Figure 4-5. Tuner Drive and Indicator Assembly

CHAPTER 5
MAINTENANCE

5-1. INTRODUCTION. This chapter contains the instructions needed to maintain the receiver in an operational condition. The level of instructions is based on the understanding that the maintenance technician has been trained on, and is familiar with the receiver and its operation. Section I of this chapter gives the organizational/field maintenance instructions and the alignment and adjustment procedures that supplement those contained on the Preventive Maintenance Workcards. Section II is not applicable, since no special maintenance instructions are required.

SECTION I
ORGANIZATIONAL/FIELD MAINTENANCE

5-2. SCOPE. This section provides instructions for maintenance of the receiver on an organizational/field maintenance level. Component board and subassembly performance test standards and alignment and adjustment procedures are provided to enable circuit testing and troubleshooting. Figure 5-1 shows the locations of the subassemblies and component boards. When performing organizational/field maintenance, frequent references to the circuit schematic diagrams and the voltage and resistance charts of Chapter 6 will be made.

5-3. MAINTENANCE TEST EQUIPMENT. Table 5-1 lists the test equipment required for organizational/field maintenance. A brief description of the operating characteristics of each item of test equipment is included in the table.

5-4. PERFORMANCE TEST STANDARDS. To determine that the receiver is operating within acceptable standards, the procedures contained on the Preventive Maintenance Workcards T.O. 31R2-5SSVR-WC-6 should be performed. Failure of the receiver to provide the acceptable test results will require troubleshooting to isolate the malfunctioning or inoperative unit.

5-5. PERFORMANCE TEST TABLES. Tables 5-2 through 5-7 provide test standards for the component boards and subassemblies of the receiver which are not fully tested in the workcard routines and for which no alignment or adjustment is possible.

5-6. TROUBLESHOOTING. To analyze and isolate the trouble, the maintenance technician must have a thorough understanding of the operation of the receiver and of each of the component boards and subassemblies of the receiver. After the trouble is isolated to a component board or subassembly, the procedures found in the component performance test tables or the component alignment and adjustment procedures should be performed to determine whether the board or subassembly is malfunctioning or inoperative. Always verify that the test equipment, test setup, and control settings are correct. Always use cables of minimum length and proper impedance. Continuity checks and voltage and resistance measurements using the information found on the circuit schematic diagrams of Chapter 6 should then be performed to locate the defective component.

5-7. REPAIR AND REPLACEMENT. Repair of the defective component or replacement of the component board or subassembly will be determined after an analysis of the trouble. After the replacement of any component board or subassembly, it must then be determined whether receiver alignment is required, or if component alignment or adjustment is sufficient.

5-8. DC OPERATING VOLTAGES. The dc operating voltage required by the component boards and subassemblies of the receiver are given in table 5-8.

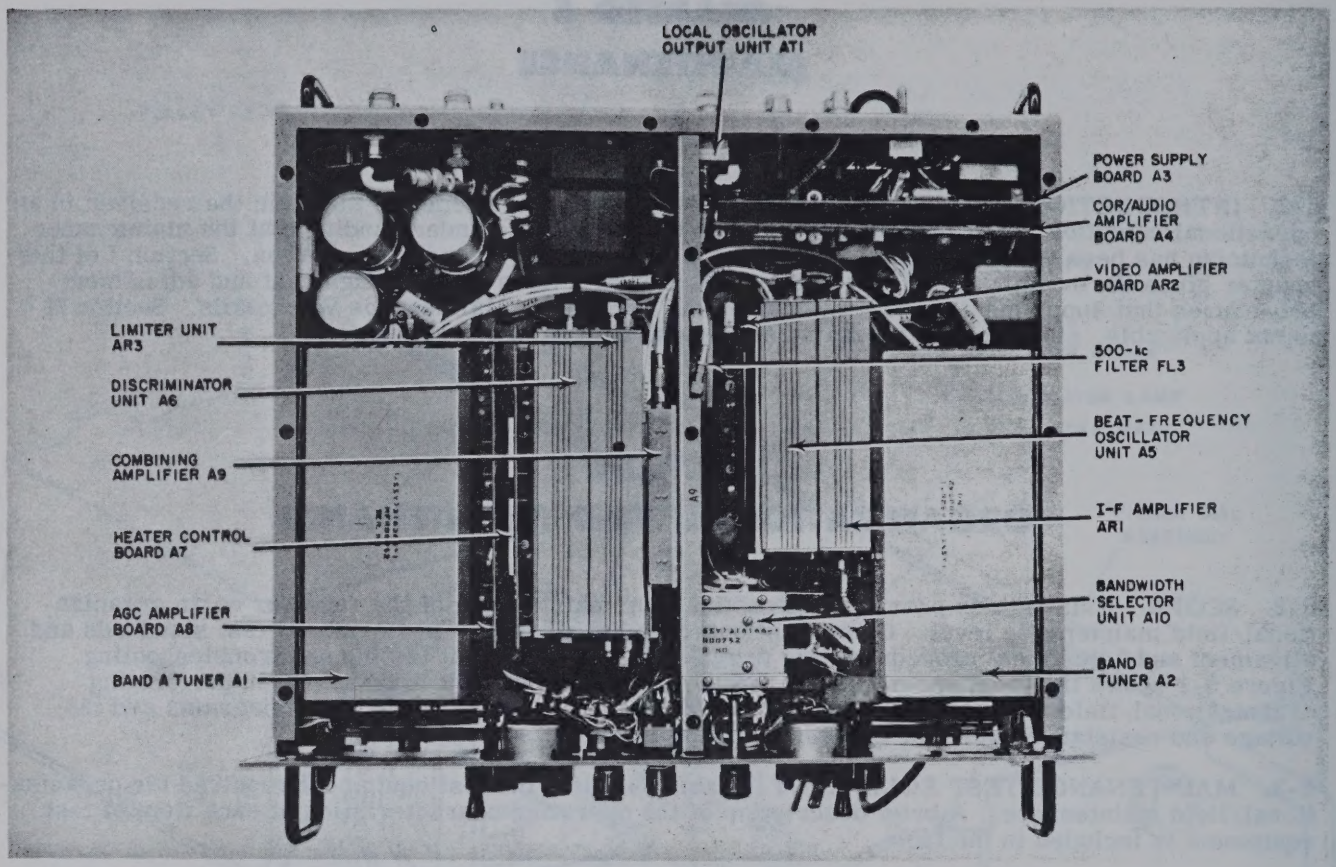


Figure 5-1. Receiver Subassembly and Component Board Locations

Table 5-1. Maintenance Test Equipment

Test Equipment	Characteristics
Oscilloscope (Tektronix 545A)	Horizontal axis frequency range: dc to 240 KHz; sweep frequency: dc to 30 MHz; vertical axis frequency range and response; dc to 30 MHz, 2 Hz to 30 MHz (ac); down 3 ± 1/2 db at 30 Mhz, 6 DB at 41 MHz.
Sweep Generator (Texscan VS-40)	Frequency range: 1 MHz to 300 MHz; sweep width: 200 KHz to 300 MHz; maximum output voltage; 0.5 VRMS into 50 ohm load.
Pulse Generator (Hewlett - Packard 214A)	Pulse rise-decay times; 0.015 µsec (10 to 90%); pulse duration: 50 ns to 10 ms, continuously variable; pulse amplitude: 100 volts.
VHF Signal Generator (Hewlett - Packard 8640B)	Frequency range: 500 KHz to 512 MHz; output level +19 to -145 dBm to within ± 0.5 dB across full frequency range.

Table 5-1. Maintenance Test Equipment (Cont)

Test Equipment	Characteristics
Video Test Oscillator (Hewlett - Packard 650A)	Frequency range and stability: 10 Hz to 10 MHz, ±2% (10 KHz to 10 MHz); output attenvator; 50 ± 1 db in 10 steps.
Audio Generator (Hewlett - Packard 200 CD)	Frequency range: 5 Hz to 600 KHz; calibration accuracy: ± 2%; 160 mw (10 volts) output.
RF Voltmeter (Hewlett - Packard 3406A)	Frequency range: 10 KHz to 1.2 KHz; voltage range: 1 mv to 3 v full scale in 8 ranges.
Digital Voltmeter (Hewlett - Packard 3440A/3445A)	Range: ± 10 v, ± 100 v, ± 1000 v; frequency range: 50 Hz to 100 KHz; input impedance 10 MΩ.
Electronic Counter (Hewlett - Packard 5254L)	Frequency range: 0 to 50 MHz (dc input), 50 Hz to 50 MHz (ac input, max. sensitivity of 100 mv rms) gate time 1 µsec to 10 seconds in decade steps; accuracy: ± 1 count ± time base accuracy.
Frequency Counter (Hewlett - Packard 5253B)	Frequency range: 50 to 500 MHz; accuracy: ± 1 count ± time base accuracy; input voltage range: 50 mv rms to 1 volt rms (-13 to + 13 dbm); maximum input: 2 volts rms or 100 vdc.
Vacuum Tube Voltmeter (Hewlett - Packard 400D)	Voltage range: 0 to 300 volts; frequency range 10 Hz to 4 MHz; input impedance; 100 megohms.
Noise Generator (Kay Electric 3000)	Frequency range: 0-3000 MHz, noise factor range: 0 to 20 db
Volt-Ohm-Milliammeter (Triplett 630)	Voltage scales: 0 to 3, 12, 60, 300, 1200, and 6000 (dc at 20,000 ohms/volt and ac at 5000 ohms/volt); current scales; 0 to 60 ua, 1.2 ma, 12 ma, 120 ma, and 12 amperes at 250 mv; resistance scales: 0 to 1000, 10,000, 1 megohm, and 100 megohms.
Quartz Thermometer (Hewlett-Packard 2801A)	Range: -80 to 250°C.
Power Supply (Hewlett-Packard 6284A)	Volts: 0-20 VDC; Amps: 0-3.
Crystal Detector	Range: .01-12.4 KHz.

Table 5-2. Local Oscillator Output Unit Performance Test Standards

Step	Operation of Test Equipment	Point of Test	Control Settings and Operation of Equipment	Performance Standards
1	Use Ohmmeter to check Resistance	J1 to J2		44 ± 2 ohms
2	Same as step 1	J1 to J3		44 ± 2 ohms

Table 5-3. Bandwidth Selector Unit Performance Test Standards

Step	Operation of Test Equipment	Point of Test	Control Settings and Operation of Equipment	Performance Standards
1	Connect signal generator output of 21.4 MHz at 0 dbm to P1. Use RF voltmeter to check output.	P4	Connect jumper leads between P3 and P6, and between P2 and P5. Set bandwidth switch to 3-MHz position. (Note: this step requires removal of filters, FL1, FL2)	95-115 mv
2	Same as step 1.	P4	Same as step 1 except set bandwidth switch to 300-KHz position.	200-245 mv
3	Same as step 1.	P4	Same as step 1 except set bandwidth switch to 60-KHz.	128-156 mv

Table 5-4. Combining Amplifier Performance Test Standards

Step	Operation of Test Equipment	Point of Test	Control Settings and Operation of Equipment	Performance Standards
1	Connect signal generator output of 21.4 Mhz, 50 - percent amplitude modulated at 1000 Hz, -30 dbm to J1. Measure output with RF voltmeter.	J4	Apply +12 volts dc to pin B and C. Ground pins J and K.	-35 dbm Minimum
2	Connect rf voltmeter to J3 and signal generator output of 21.4 MHz, 50-percent amplitude modulated at 1000 Hz, -18 dbm to J1.	J3		-41 dbm Minimum to -30 dbm Maximum
3	Repeat steps 1-2, substituting J2 for J1.	Same as Steps 1-2	Apply -16 volts dc to pin A	Same as steps 1-2

Table 5-5. Limiter Unit Performance Test Standards

Step	Operation of Test Equipment	Point of Test	Control Settings and Operation of Equipment	Performance Standards
1	Connect a signal generator output of 21.4 MHz, 50- percent amplitude modulated at 1000 Hz to J2. Adjust signal generator for 50 mv using RF voltmeter. Use oscilloscope to measure outputs.	J3	Set C23 to mid-range. Apply +12 volts dc to pins H and J. Apply -12 volts dc to pins E and F. Ground pins A, B, and K.	0.4 to 2.0 volts peak to peak
2	Same as step 1.	J4		0.7 to 0.7 volt peak to peak.
3	Same as step 1.	J5		Ac amplitude: 2.5 to 5.0 volts peak to peak Dc amplitude: 7-12 volts dc

Tabel 5-5. Limiter Unit Performance Test Standards (Cont)

Step	Operation of Test Equipment	Point of Test	Control Settings and Operation of Equipment	Performance Standards
4	Same as step 1.	J6		Ac amplitude 0.5 to 1.0 volt peak to peak Dc amplitude: 0.5 to 1.0
5	Same as step 1.	J7		Ac amplitude 0.095 to 0.4 volt Dc amplitude: 150 mv maximum
6	Same as step 1 except increase input level until output at J5 is no longer modulated as indicated by dip in flat portion of modulated waveform.	J5		85 - 125 mv
7	Adjust input level to obtain a 30-mv indication on rf voltmeter for frequencies of 21.4 MHz, 19.4 MHz, and 23.4 MHz.	J3		18 dbm maximum. No two of the input levels must differ by more than 2 db.
8	Measure frequency at which maximum gain occurs.	J3		19-24 MHz

Table 5-6. Video Amplifier Board Performance Test Standards

Step	Operation of Test Equipment	Point of Test	Control Settings and Operation of Equipment	Performance Standards
1	Connect video generator output of 1 KHz to pin C. Adjust for 0.078 volt rms with voltmeter.	Pin V	Apply +12 volts dc to pin D. Ground pin Z.	Use db reading as reference level
2	Same as step 1 except increase frequency while maintaining signal level until reference level less 3-db reading is obtained.	Same as Step 1.		1.5 MHz minimum.

Table 5-6. Video Amplifier Board Performance Test Standards (Cont)

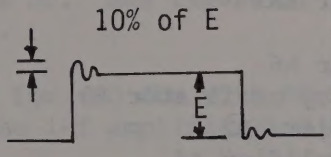
Step	Operation of Test Equipment	Point of Test	Control Settings and Operation of Equipment	Performance Standards
3	Same as step 2 except decrease frequency.	Same as step 1.		70 Hz maximum.
4	Same as step 1 except adjust output amplitude until 1 volt rms reading is obtained on voltmeter connected to pin V.	Pin C		36 mv maximum.
5	Same as step 4.	Pins X and Y.		1.6 volts dc minimum to 2.7 volts dc maximum.
6	Connect pulse generator output of 1-usec positive pulse at 1- KHz rate to pin C, and use oscilloscope to observe output. Increase pulse amplitude until limiting pulses are obtained.	Pin V		Output amplitude of limited pulses should be 1.3 to 4.0 volts.
7	Same as step 6 except decrease amplitude of input until pulses are no longer limited.	Pin V		Waveshape should be rectangular and distortion amplitude due to overshoot and distortion should not exceed 10% of pulse amplitude.

Table 5-7. Audio Amplifier of Cor/Audio Amplifier Board Performance Test Standards

Step	Operation of Test Equipment	Point of Test	Control Settings and Operation of Equipment	Performance Standards
1	Connect audio generator output of 1 KHz to TP2 and voltmeter to receiver TB 1, pins 13 and 15. Adjust audio generator for a 1.0 volt rms output level at pins 13 and 15.	TP2	Audio Amplifier board in receiver. Terminate pins 13 and 15 with 600-ohm load. AUD/VID gain to mid-position.	Input for 1-volt rms output is 0.10 volt rms or less.

Table 5-7. Audio Amplifier of Cor/Audio Amplifier Board Performance Test Standards (Cont)

Step	Operation of Test Equipment	Point of Test	Control Settings and Operation of Equipment	Performance Standards
2	Same as step 1 except increase frequency until indicated output voltage is 0.7 volt while maintaining input level.	Pins 13 and 15.		20-40 KHz
3	Same as step 2 except decrease frequency	Same as step 2		70Hz maximum
4	Connect audio generator 1 KHz to TP2. Use oscilloscope to observe output at TB1, pins 13 and 15. Adjust input level until maximum output without clipping is obtained.	Pins 14 and 15		Minimum output with no clipping is 7.8 volts rms.

Table 5-8. DC Operating Voltage Requirements

Component	DC Voltage Required	Source
Band A tuner A1	+110, +12	All dc operating voltages are obtained from the power supply A5.
Band B tuner A2	+110, +12	
Combining Amplifier A9	-16, +12	
I-F amplifier AR1	+12	
Limiter AR3	+12, -12	
Discriminator A6	+12	
Beat frequency oscillator A5	+12, -12	
Video amplifier AR2	+12	
Cor/audio amplifier A4	+12, -12, -16	
Automatic gain control amplifier A8	+12, -12	

5-9. ALIGNMENT PROCEDURES.

5-10. The alignment and adjustment procedures contained herein are presented in the order to be followed when the entire receiver is to be aligned. Because of the physical and electrical construction of the receiver, certain components can be more easily adjusted and aligned when they are removed from the receiver, while the adjustment of other components requires that the receiver be completely assembled when alignment is performed. The receiver alignment procedure (with all components installed in their normal operating position) is based on the assumption that the components have been aligned and adjusted as described in the component alignment procedures prior to installation in the receiver. The following procedures should be observed in performing the following tests.

a. Adequate warm-up time should be allowed for test equipment and receiver to stabilize prior to performing tests. This is particularly important for any tube-

type test equipment and for any tests involving the RF tuners which contain tubes and heaters.

b. When using a RF probe it is critical that the probe be grounded. It is preferable to use a straight BNC connection for all RF measurements.

c. All RF adjustments should be made with metallic cases properly enclosed.

d. Use non-metallic alignment tools when adjusting RF modules.

5-11. COMPONENT ALIGNMENT PROCEDURES.

5-12. I-F AMPLIFIER ALIGNMENT.

a. Connect the test equipment as shown in figure 5-2.

b. Set the signal generator to 21.4 MHz and adjust output level to provide a marker indication on the oscilloscope.

c. Set the sweep generator to sweep about a center frequency of 21.4 MHz and to provide a waveform similar to figure 5-3.

d. Adjust the sweep generator and attenuator to maintain a detected waveform below a 40-mv peak. See figure 5-3.

e. Set the oscilloscope to dc mode. Increase the attenuator setting 3 db. Position the peak of curve displayed on the oscilloscope at the center line of the grid. Reduce the attenuator setting 3 db. Where the curve now crosses the centerline of the grid are the 3 db points. See figure 3. Adjust L2, L3, L4, L6 and L10 alternately to obtain a flat response (to within 3 db) from 19.4 to 23.4 MHz on the oscilloscope for agc settings of +2, 0, -4, -8 volts dc. See figure 3. Repeat adjustments until the required results are obtained.

f. Set signal generator to 21.4 MHz and adjust for -60 dbm with RF voltmeter. Connect the signal generator to connector J1 of the i-f amplifier and a 1000-pf capacitor and rf voltmeter to connector J2.

g. Apply +2 volts dc to the agc input of the i-f amplifier and measure the gain. It should be 68 db minimum and 72 db maximum.

h. Apply -8 volts dc to the agc input of the i-f amplifier and measure the gain. It should be 0 dbm nominal, +3 db maximum.

5-13. DISCRIMINATOR ALIGNMENT.

a. Connect the test equipment as shown in figure 5-4.

b. Place the BANDWIDTH SEL switch in the 60-kc position and the MODE SEL switch to FM.

c. Set the sweep generator for a frequency of 21.4 MHz and adjust it for best scope presentation. Increase signal amplitude until there is no change in the signal presented on the scope.

d. Ajust L5 on the discriminator for a symmetrical curve with maximum amplitude as shown in figure 5-4.

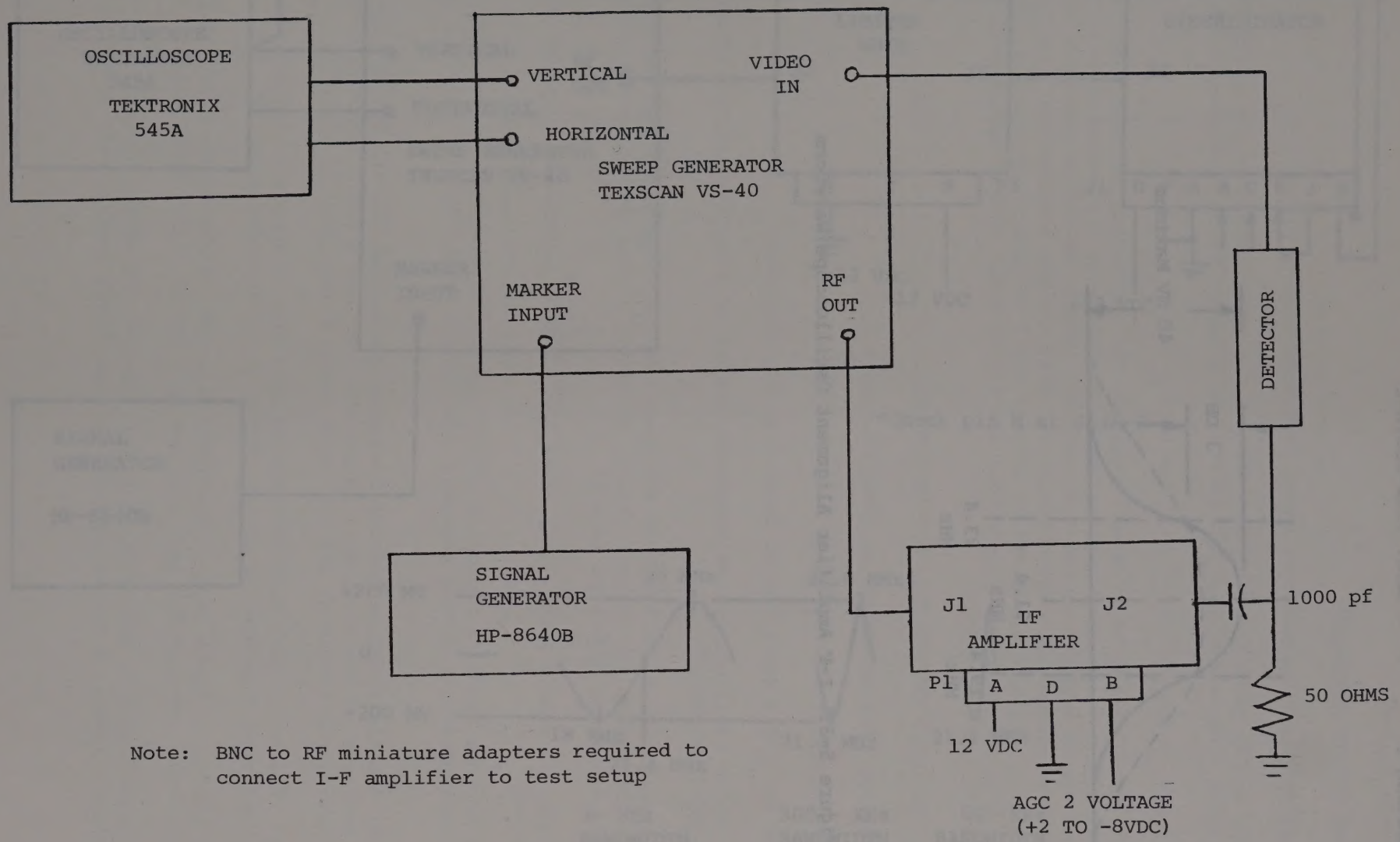
e. Sweep the waveform with the marker from the signal generator by varying the output frequency into the sweep generator and adjust L5 on the discriminator so it conforms to the waveform for 60 KHz in figure 5-4.

f. Place the BANDWIDTH SEL switch in the 300-kc position and adjust sweep generator for a suitable waveshape on the scope.

g. Adjust L3 and L4 on the discriminator until scope presentation matches the 300 KHz waveshape shown in figure 5-4 in both amplitude and frequency.

h. Place the Bandwidth Sel switch in the 3-Mc position and adjust sweep generator for a suitable scope presentation.

i. Adjust L1 and L2 on the discriminator until scope presentation matches the 3 MHz waveshape shown in figure 5-4 in both amplitude and frequency.



Note: BNC to RF miniature adapters required to connect I-F amplifier to test setup

Figure 5-2. I-F Amplifier Alignment Procedure, Test Equipment Setup

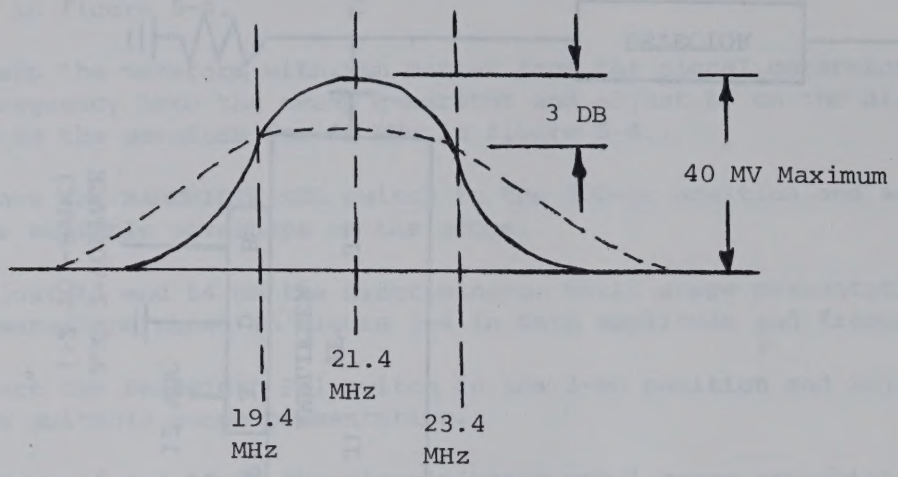


Figure 5-3. I-F Amplifier Alignment Oscilloscope Waveform

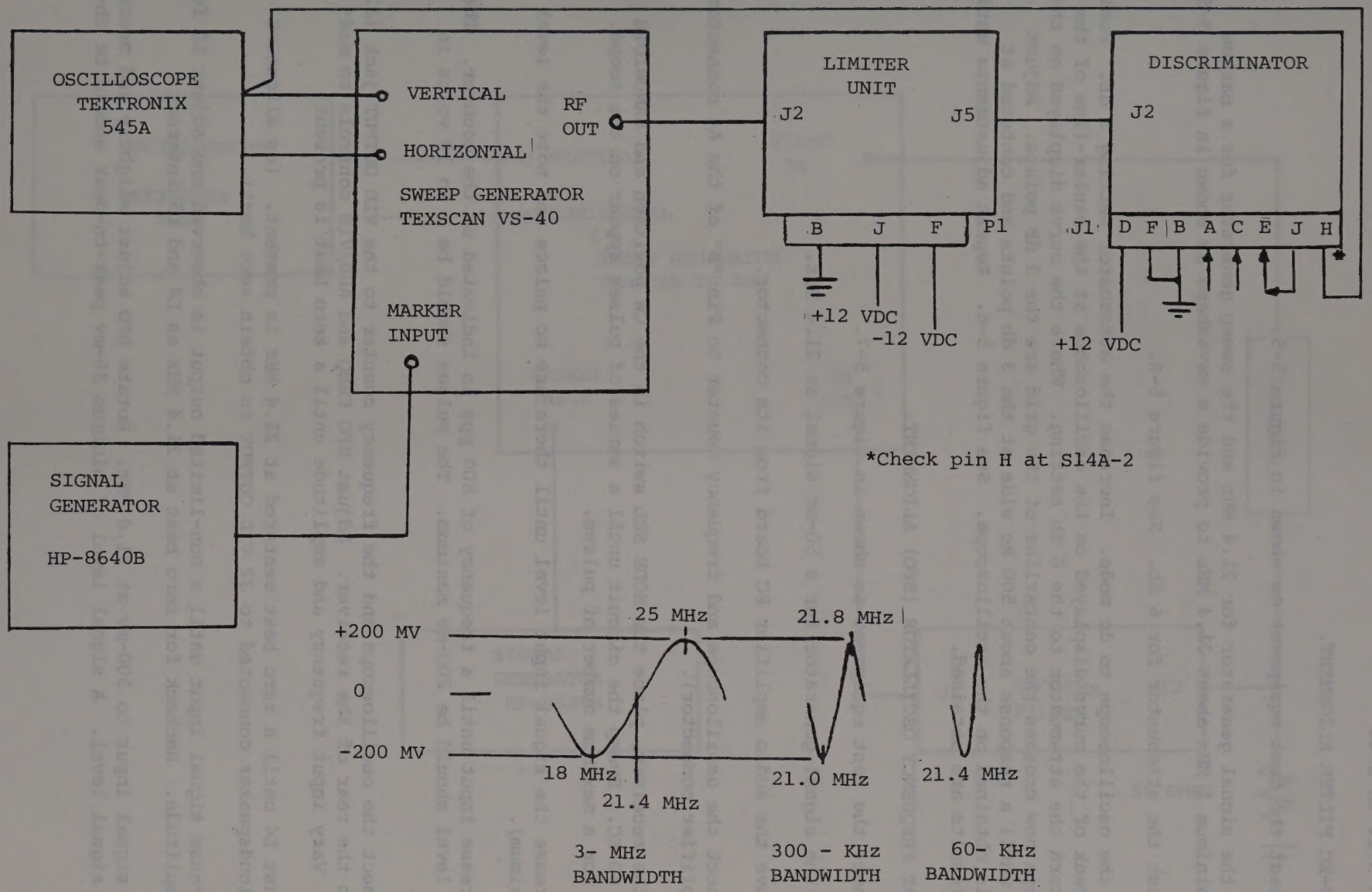


Figure 5-4. Discriminator Alignment Procedure, Test Equipment Set up

5-14. 500-KC FILTER ALIGNMENT.

a. Connect the test equipment as shown in figure 5-5.

b. Set the signal generator for 21.4 MHz and the sweep generator for a narrow sweep of minimum 1 MHz about 21.4 MHz to provide a waveshape as shown in figure 5-5.

c. Adjust the attenuator for 6 db. See figure 5-6.

d. Set the oscilloscope to dc mode. Increase the attenuator setting 3 db. Position the peak of the curve displayed on the oscilloscope at the center-line of the grid. Return the attenuator to the 6 db setting. Where the curve displayed on the oscilloscope now crosses the centerline of the grid are the 3 db points. Adjust C2 and C3 until a response about 500 kc wide at the 3 db points and centered at 21.4 MHz is obtained on the oscilloscope. See figure 5-6. Repeat adjustments until required results are obtained.

5-15. BEAT FREQUENCY OSCILLATOR (BFO) ALIGNMENT.

a. Connect the test equipment as shown in figure 5-7.

b. Set the signal generator for a 50-mv signal at 21.4 MHz.

c. Remove the audio amplifier PC board from its connector.

d. Connect the oscilloscope and frequency counter to Pin "A" of the A4 connector (audio amplifier connector).

e. On the receiver, place the MODE SEL switch in the CW position and BANDWIDTH switch to 60 KC. Sweep the circuit until a series of pulses appear on the scope. Adjust L1 for a maximum number of pulses.

f. Decrease the signal input level until there are no pulses and note the level (35-mv maximum).

g. Increase input until a frequency of 800 pps is indicated on the counter. The RF signal level should be 200-mv maximum. The pulses should be 3 to 10 volts in amplitude.

h. Connect the oscilloscope and the frequency counter to the VID OUTPUT jack (J2) located on the rear of the receiver. Adjust BFO FREQ and AUD/VID controls to mid-position. Vary input frequency and amplitude until a zero beat is present.

i. Adjust L4 until a zero beat centered at 21.4 MHz is present. (as alignment aid, use loudspeaker connected to J2 VID OUTPUT to obtain zero beat).

j. Decrease signal input until a non-limited output is observed and adjust L5 for maximum amplitude. Recheck for zero beat at 21.4 MHz as L4 and L5 interact.

k. Set signal input to 300-mv at 21.4 MHz. Rotate BFO adjust slightly and measure the audio signal level. A signal level of minimum 36-mv peak-to-peak should be observed.

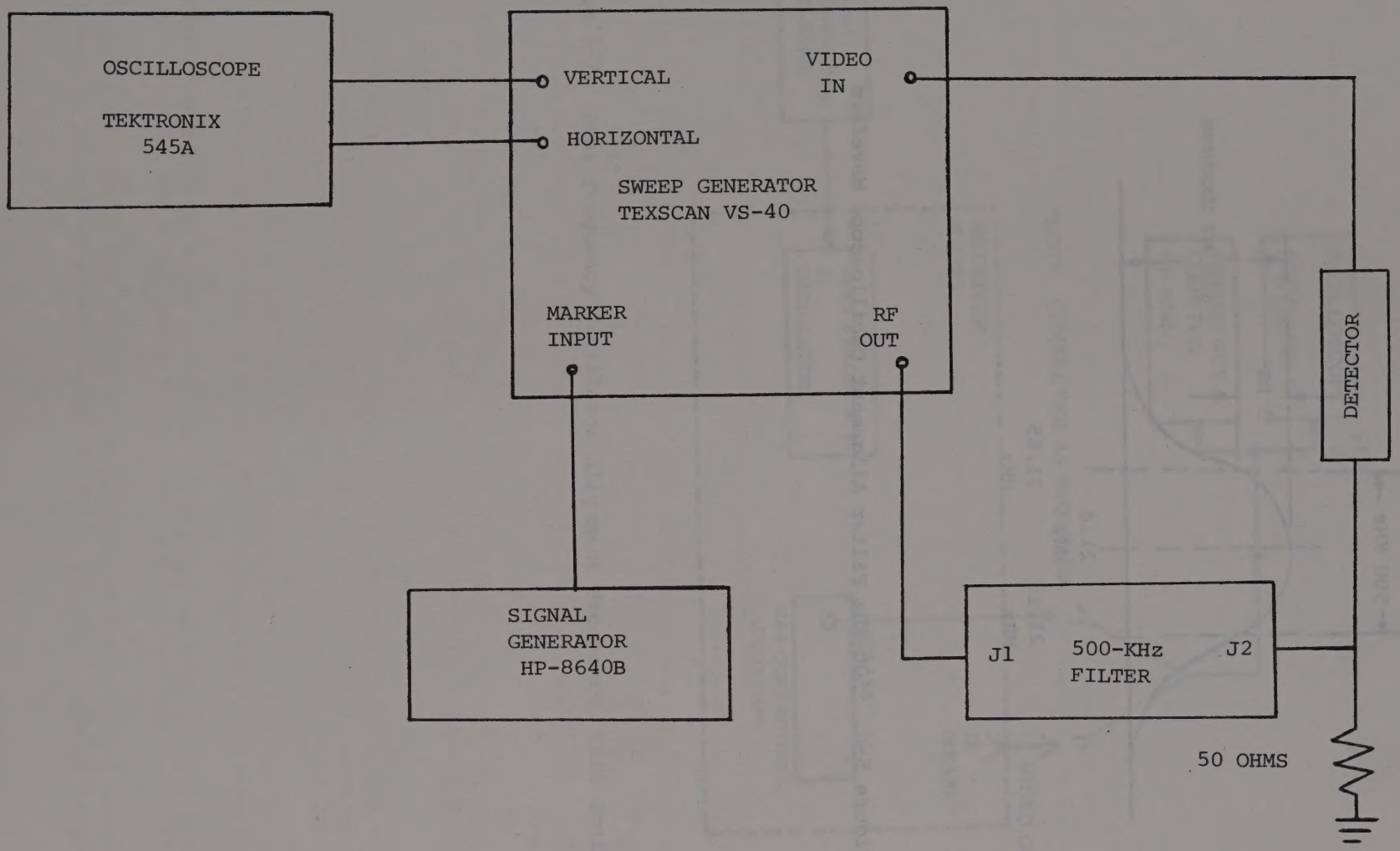


Figure 5-5. 500-KHz Filter Alignment Procedure, Test Equipment Setup

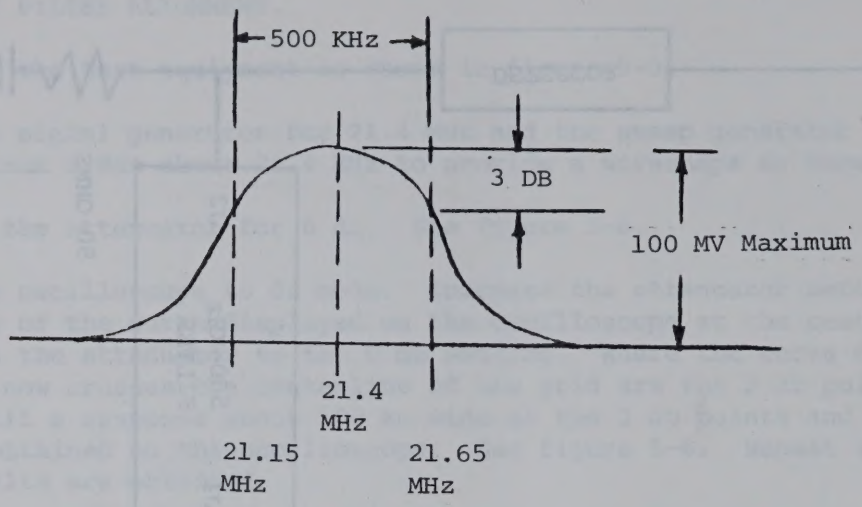


Figure 5-6. 500-KHz Filter Alignment Oscilloscope Waveform

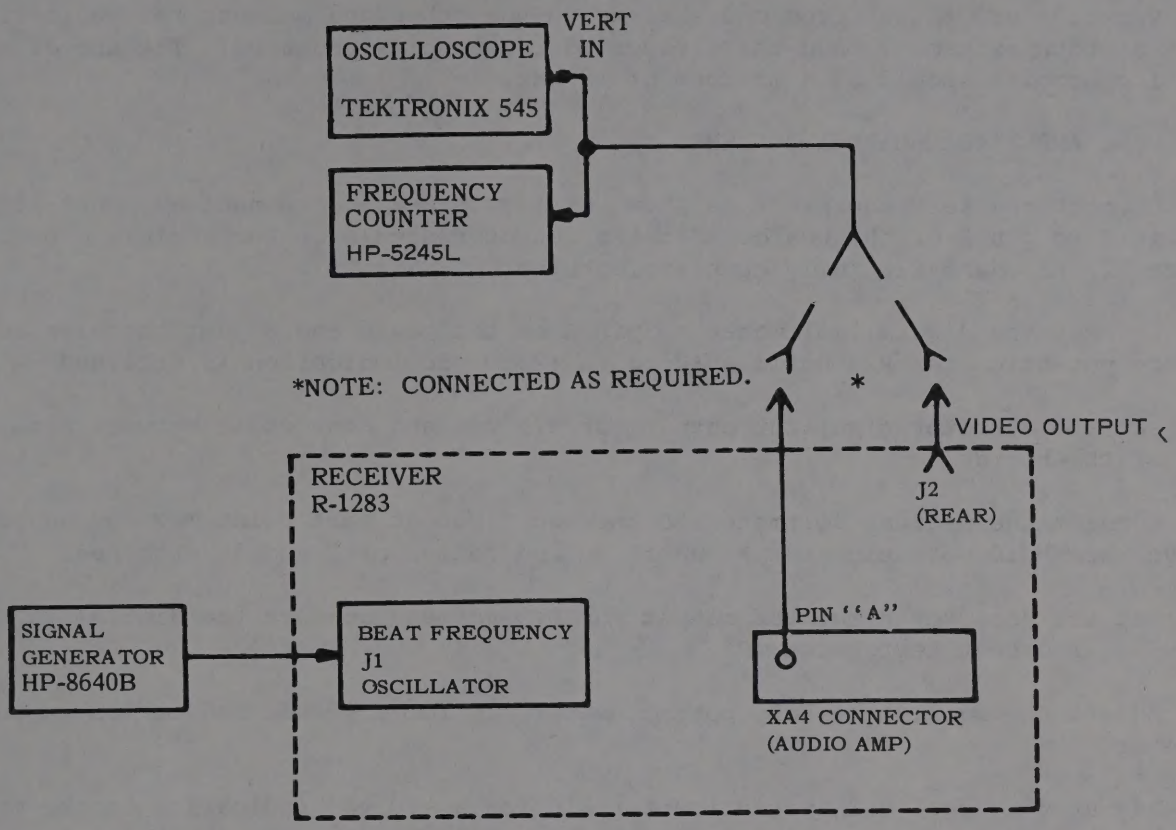


Figure 5-7. Beat Frequency Oscillator Alignment Procedure, Test Equipment Setup

l. Vary the BFO adjust from one extreme to the other and measure the audio frequency at both extremes. Add these recorded frequencies together. The sum of these frequencies should be a minimum of 12 KHz.

5-16. AGC AMPLIFIER BOARD ALIGNMENT.

a. Connect the test equipment as shown in figure 5-8 and connect a jumper lead from pin J to pin F of the board. Set the detector simulator for a minimum output and set R1, R16, and R18 fully counterclockwise.

b. Connect the digital voltmeter to pin L of the board and adjust the bias adjustment potentiometer R24 until a +2.25 to +2.50 vdc indication is obtained.

c. Set the detector simulator output for 0.5 vdc and connect it between pins D and B of the board.

d. Connect the digital voltmeter to the agc 2 output test point TP2 and adjust the agc threshold potentiometer R1 until an indication of 1 vdc is obtained.

e. Set the detector simulator output for 0.9 vdc and connect the digital voltmeter to the agc 1 output test point TP3.

f. Adjust the agc 1 threshold potentiometer R18 for a -9 vdc indication on the voltmeter.

g. Adjust the agc 1 gain potentiometer R16 for a -10 vdc indication on the voltmeter.

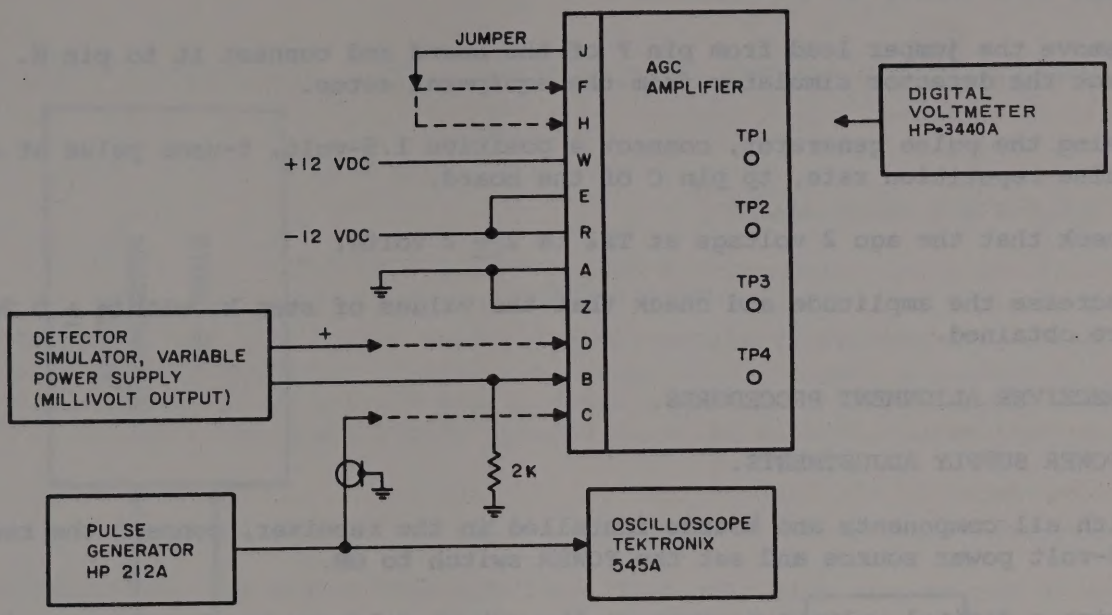
h. Increase the detector simulator output to 2 vdc. Connect the digital voltmeter to each of the test points specified below. The measured values must be within the specified limits.

TEST POINT	VOLTAGE (VDC)	
TP3 (agc 1)	-10 to -12	
TP2 (agc 2)	-8 to -12	
TP4 (agc 3)	+4 to +12	-(May require resistor change to obtain correct voltage, ref. note 1, figure 6-13A)

Note: Refer to figure 5-8 for a graphic representation of the detector simulator voltages versus the agc voltages.

i. Set the detector simulator output to 0 volt. Connect the digital voltmeter to each of the test points specified below. The measure values must be within the specified limits.

TEST POINT	VOLTAGE (VDC)
TP3 (agc 1)	+1 to +3
TP2 (agc 2)	+1 to +3
TP4 (agc 3)	-8 to -12



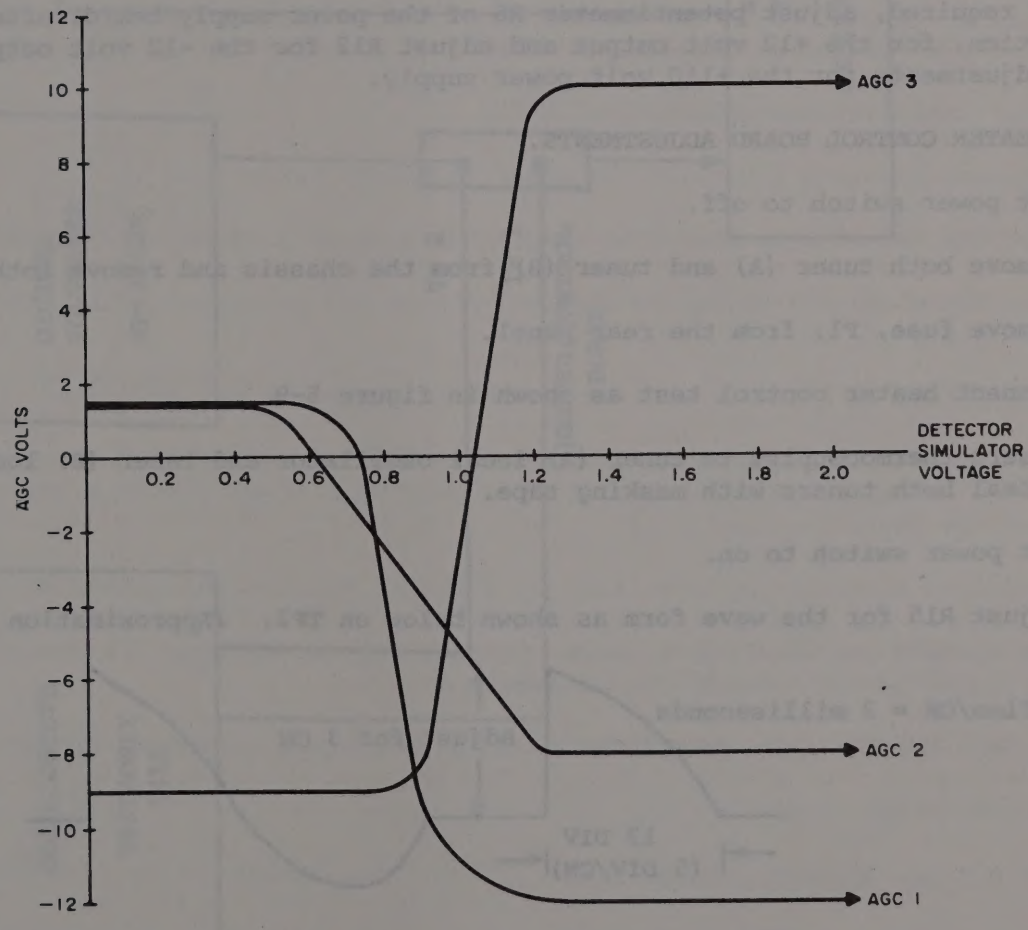


Figure 5-8. Automatic Gain Control Amplifier Alignment Procedure, Test Equipment Setup

j. Remove the jumper lead from pin F of the board and connect it to pin H. Disconnect the detector simulator from the equipment setup.

k. Using the pulse generator, connect a positive 1.5-volt, 5-usec pulse at a 1-KHz pulse repetition rate, tp pin C of the board.

l. Check that the agc 2 voltage at TP2 is 2 ± 2 volts.

m. Increase the amplitude and check that the values of step h, within ± 0.20 volt, are obtained.

5-17. RECEIVER ALIGNMENT PROCEDURES.

5-18. POWER SUPPLY ADJUSTMENTS.

a. With all components and boards installed in the receiver, connect the receiver to a 115-volt power source and set the POWER switch to ON.

b. Using a digital voltmeter, measure the output voltages at the VDC test jacks located on the rear panel of the receiver; readings of +12 ± 0.5 volts dc, -12 ± 0.05 volts, dc and +110 ± 11 volts dc should be obtained.

c. If required, adjust potentiometer R6 of the power supply board, after 1 hour of operation, for the +12 volt output and adjust R12 for the -12 volt output; there are no adjustments for the +110 volt power supply.

5-19. HEATER CONTROL BOARD ADJUSTMENTS.

a. Set power switch to off.

b. Remove both tuner (A) and tuner (B) from the chassis and remove both top covers.

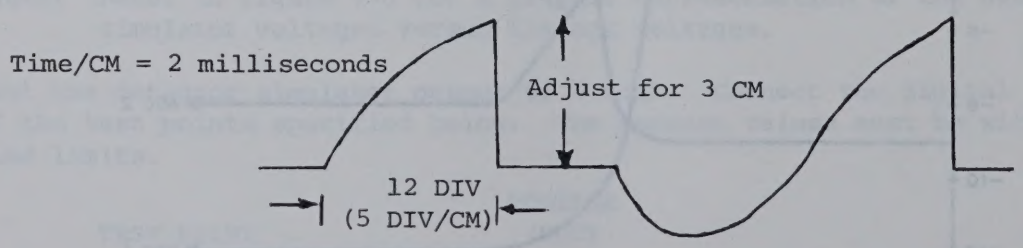
c. Remove fuse, F1, from the rear panel.

d. Connect heater control test as shown in figure 5-9.

e. Insert thermocouples to tuner (A) local oscillator and tuner (B) local oscillator. Seal both tuners with masking tape.

f. Set power switch to on.

g. Adjust R15 for the wave form as shown below on TP2. (Approximation only)



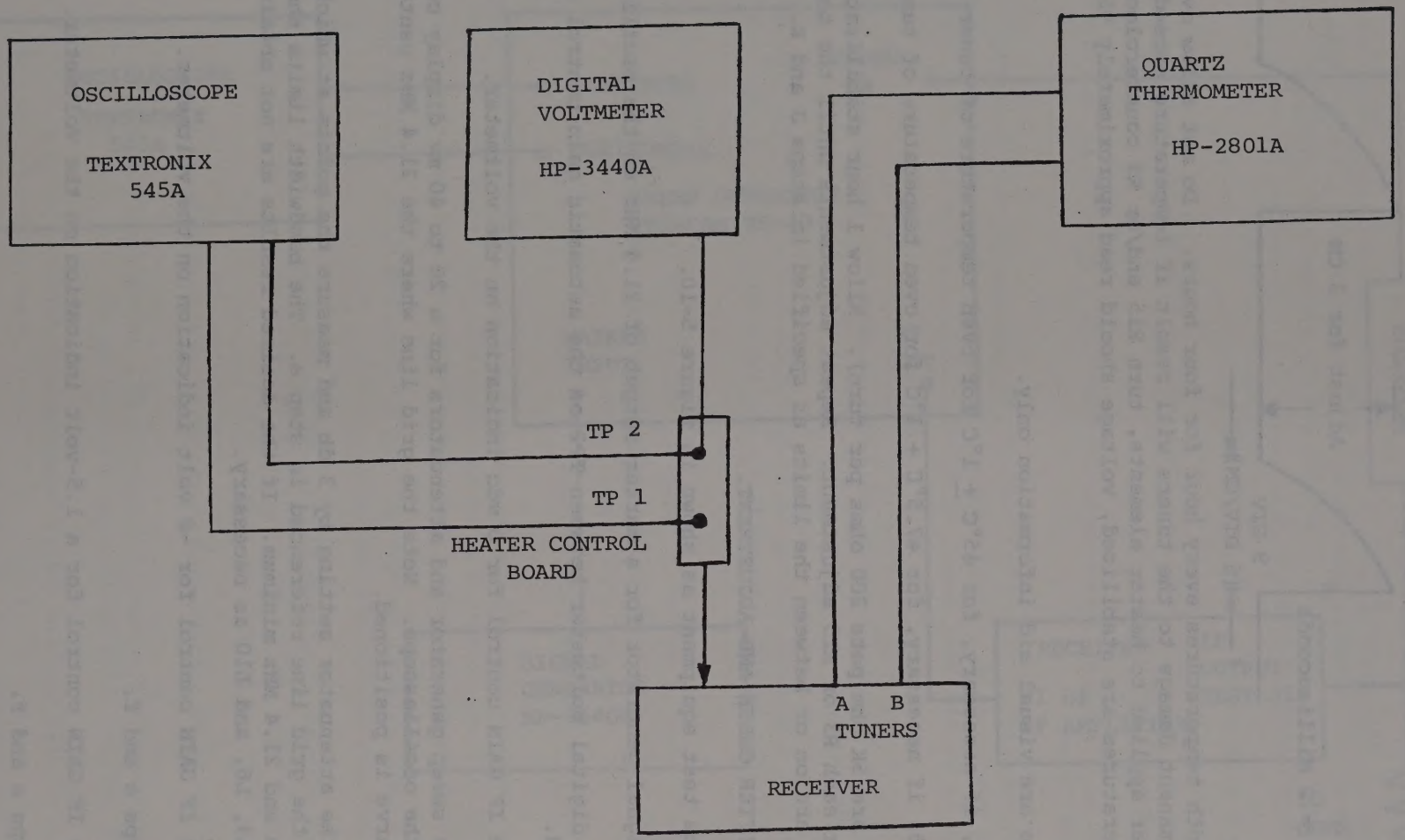
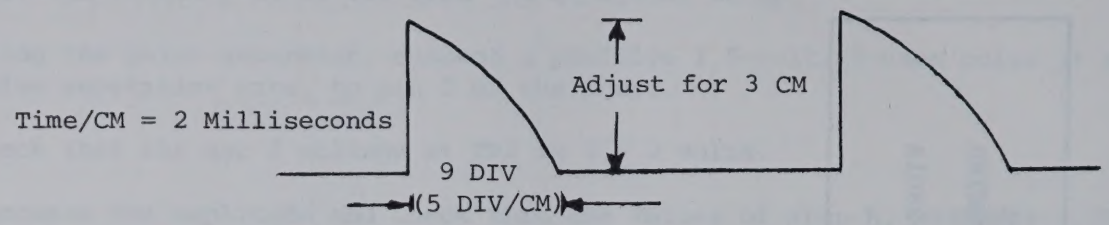


Figure 5-9. Heater Control Board Adjustment Procedure, Test Equipment Setup

h. Adjust R3 for the waveform as shown below on TP1. (Approximation only)



i. Monitor both temperatures every hour for four hours. Do not allow ovens to overheat as permanent damage to the tuners will result if temperature exceeds 60°C. To decrease power applied to heater elements, turn R15 and/or R3 counterclockwise. After oven temperatures are stabilized, voltage should read approximately 95 ± 1 V rms.

NOTE: Waveforms are visual aid information only.

j. Adjust R3, if necessary, for 45°C ± 1°C for oven temperature of tuner (A).

k. Adjust R15, if necessary, for 47.5°C ± 1°C for oven temperature of tuner (B).

NOTE: (R3 & R15 are 5K ohm pots 200 ohms per turn). Allow 1 hour stabilization time after each R3 or R15 adjustment. Repeat adjustments until the temperatures are on or between the limits as specified in steps J and K.

5-20. I-F AMPLIFIER CHECK AND ADJUSTMENT.

a. Connect the test equipment as shown in figure 5-10.

b. Set the signal generator for a marker output of 21.4 MHz on the oscilloscope.

c. Connect a digital voltmeter between TP2 on the automatic gain control amplifier board and ground.

d. Adjust the IF GAIN control for 0 vdc indication on the voltmeter.

e. Adjust the sweep generator and attenuators for a 20 to 40 mv display centered at 21.4 MHz on the oscilloscope. Note the grid line where the 21.4 MHz center frequency of the curve is positioned.

f. Decrease the attenuator setting by 3 db and measure the points at which the curve intersect the grid line referenced in step e. The bandwidth limits should be 19.4 MHz maximum and 21.4 MHz minimum. If the desired results are not obtained, adjust L2, L3, L4, L6, and L10 as necessary.

g. Adjust the IF GAIN control for -8 volt indication on the voltmeter.

h. Repeat steps e and f.

i. Adjust the IF GAIN control for a 1.5-volt indication on the voltmeter.

j. Repeat steps e and f.

k. Connect the test equipment as shown in figure 5-11.

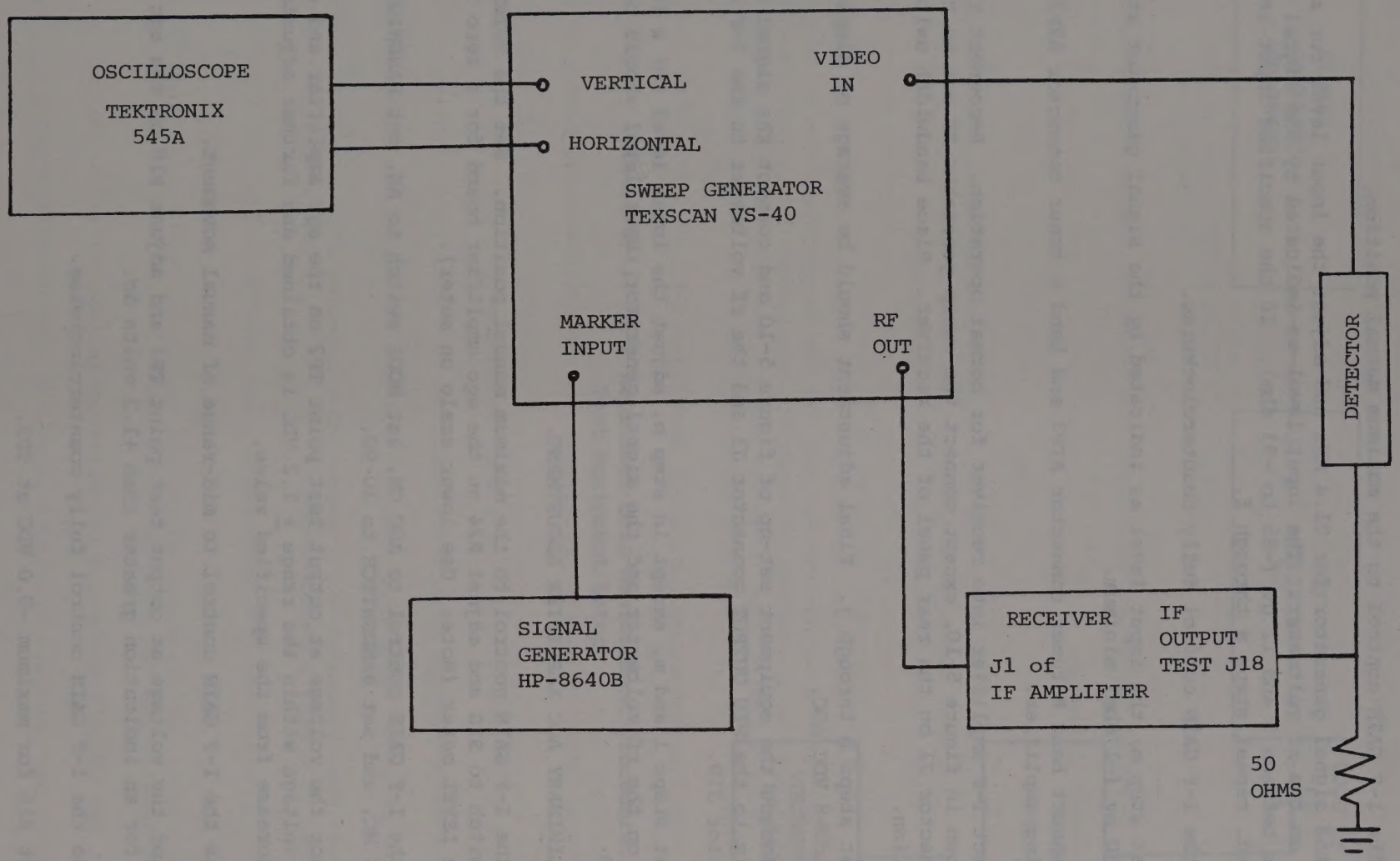


Figure 5-10. I-F Amplifier Adjustment Procedure, Test Equipment Setup

l. Set the I-F GAIN control to the maximum manual position.

m. Set the signal generator for 21.4 MHz and adjust the input level for a 30-mv indication on the rf voltmeter. The input level as indicated by the signal generator must be between 5 and 12 uv (-85 to -93 dbm). If the specified input level is not obtained, repeat steps a through f.

n. Set the I-F GAIN control fully counterclockwise.

o. Repeat step m; the input level as indicated by the signal generator attenuator should be 30 mv (-17dbm) minimum.

p. Disconnect band A tuner connector AIP3 and band B tuner connector A2P3 from the combining amplifier.

q. Connect I-F amplifier into receiver for normal operation. Reconnect the equipment as shown in figure 5-10, except connect the sweep generator RF out to the PIU OUTPUT connector J1 on the rear panel of the receiver. Place bandwidth switch to 3 MHz position.

r. Repeat steps b through j. Final adjustment should be average of displays at +1.5, 0, and -8 VDC AGC.

s. Disconnect the equipment set-up of figure 5-10 and connect the signal generator directly to the PIU OUTPUT connector J1 and the rf voltmeter to the I-F OUTPUT TEST connector J18.

t. Repeat steps l and m, except in step m, adjust the input level for a 100 mv indication on the rf voltmeter and the signal generator input level should be -57 dbm maximum.

5-21. PRELIMINARY AGC AMPLIFIER ADJUSTMENT.

a. Set the I-F GAIN control to the maximum manual position. Set the METER SELECTOR switch to SIG and adjust R24 on the agc amplifier board for a zero indication on the LEVEL meter (Note: Use lower scale on meter).

b. Set the I-F GAIN control to AGC ON, set MODE switch to AM, set BANDWIDTH switch to 3 MC, and set BANDSWITCH to 30-90.

c. Monitor the voltage at output test point TP2 on the agc amplifier and adjust R1 until a voltage within the range $\pm$ 1.2 VDC is obtained and further adjustment causes a decrease from the specified value.

d. Rotate the I-F GAIN control to mid-range of manual movement.

e. Monitor the voltage at output test point TP3 and adjust R18 on the agc amplifier board for an indication greater than +1.2 volts dc.

f. Rotate the I-F GAIN control fully counterclockwise.

g. Adjust R16 for maximum -9.0 VDC at TP3.

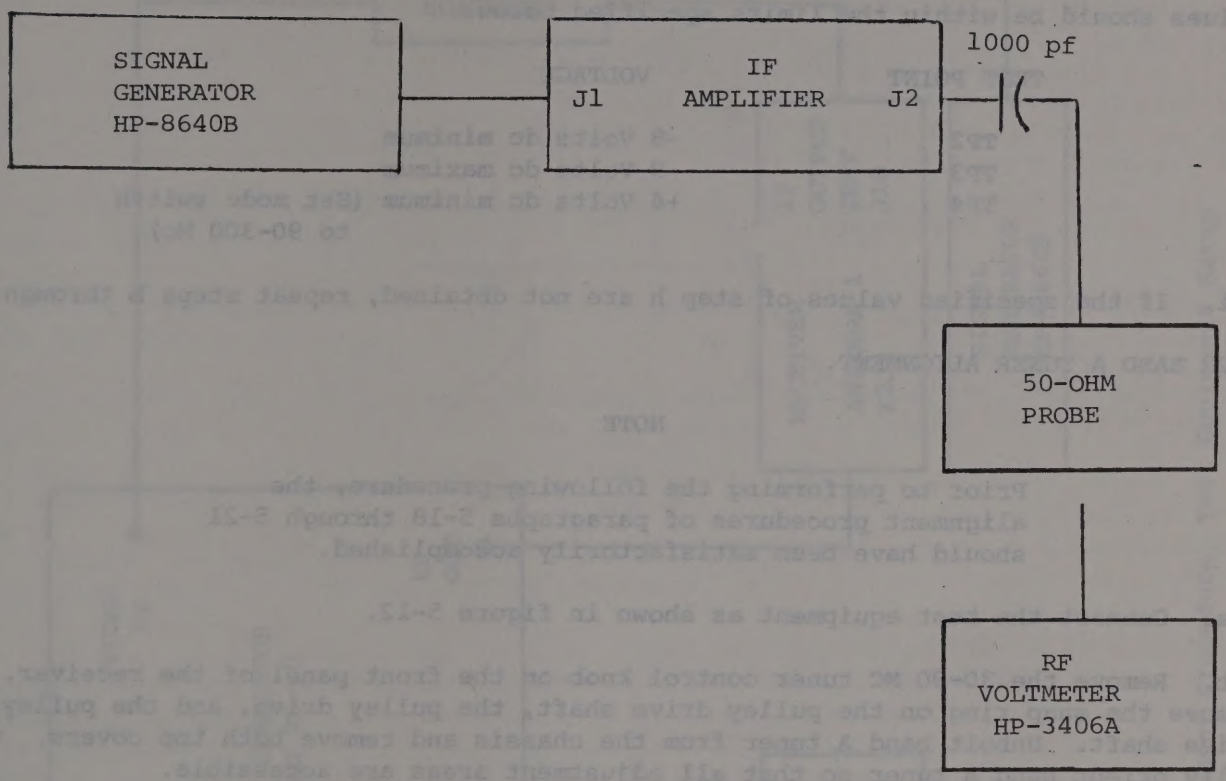


Figure 5-11. I-F Amplifier Gain Measurement Procedure, Test Equipment Setup

h. Monitor the voltages at output test points TP2, TP3, and TP4. The measured values should be within the limits specified below.

TEST POINT	VOLTAGE
TP2	-8 Volts dc minimum
TP3	-9 Volts dc maximum
TP4	+4 Volts dc minimum (Set mode switch to 90-300 Mc)

i. If the specified values of step h are not obtained, repeat steps b through h.

5-22 BAND A TUNER ALIGNMENT.

NOTE

Prior to performing the following procedure, the alignment procedures of paragraphs 5-18 through 5-21 should have been satisfactorily accomplished.

a. Connect the test equipment as shown in figure 5-12.

b. Remove the 30-90 MC tuner control knob on the front panel of the receiver. Remove the snap ring on the pulley drive shaft, the pulley drive, and the pulley drive shaft. Unbolt band A tuner from the chassis and remove both top covers. Carefully orient band A tuner so that all adjustment areas are accessible.

c. Check that the tuner dial is at its mechanical stop when the dial is set to the large mark beyone the 91-MHz mark.

d. Set the BAND switch to 30-90, the BANDWIDTH switch to 3 MC, the MODE switch to AM, the METER SELECTOR switch to SIG, and the ANTENNA SELECTOR switch to 1.

e. Monitor the voltage at output test point TP3 on the agc amplifier board and adjust the I-F GAIN control for a +1.2 volt dc indication.

f. Set the tuner control dial to 60 MHz.

g. Set the rf signal generator to 60 MC and the I-F signal generator to 21.4 MHz.

h. Set the sweep generator for a sweep about a center frequency of 60 MHz, to give a display as shown in figure 5-13.

i. Adjust C3, C12, C38, C19, C21, and C27 for maximum output indication on the oscilloscope.

j. Observing the oscilloscope, adjust the variable attenuators to obtain a detected output between 40 and 100 mv. See figure 5-13.

k. Adjust C33 until the I-F and rf markers coincide.

l. Set the tuner control, rf signal generator, and sweep generator to 90 MHz dial indications.

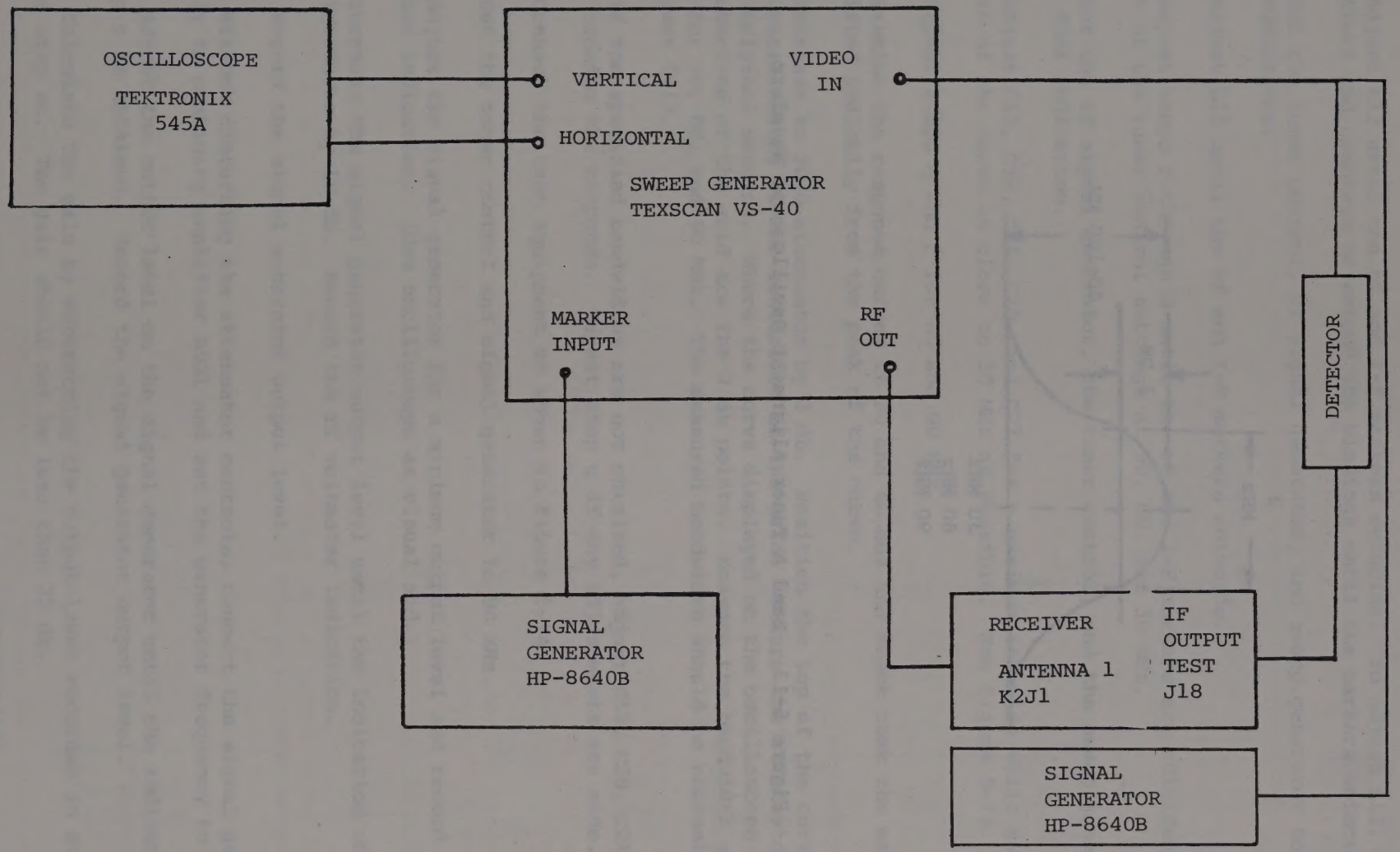


Figure 5-12. Tuner Alignment Procedure, Test Equipment Setup

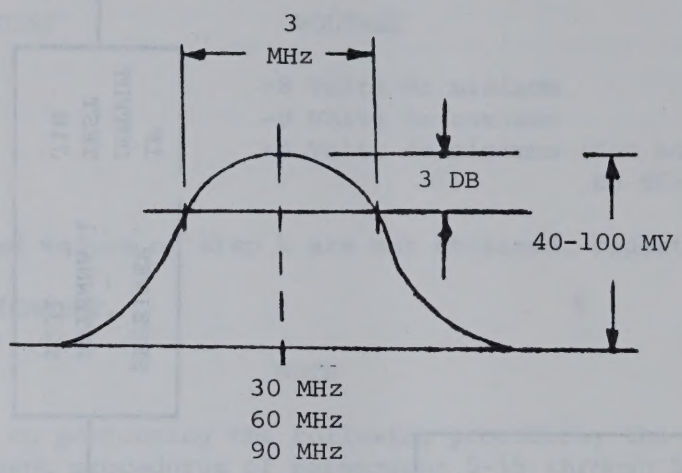


Figure 5-13. Band A Tuner Alignment Oscilloscope Waveform

m. Adjust L12 until the rf and I-F markers coincide. To adjust L12, use long-nose pliers and compress or extend the windings until the markers coincide.

n. Set the tuner control, rf signal generator, and sweep generator to 30 MHz, dial indications.

o. Adjust L13 until the rf and I-F markers coincide.

p. Repeat steps f through 0 until the rf and I-F markers are coicident within +1 percent of the tuner control settings at 90, 60, and 30 MHz.

q. Set the rf signal generator, the tuner control, and the sweep generator to 30 MHz dial indication.

r. Adjust C12, C38, C21, C19, and C27 for a maximum response while maintaining the peak of the curve as close to 30 MHz as possible. See figure 5-13.

s. Repeat steps q and r for 60 and 90 MHz.

t. Examine the response curves at 30 and 60 MHz and check that the markers have not drifted radically from the peak of the curve.

u. Increase to 30-0 attenuator by 3 db. Position the top of the curve displayed on the oscilloscope at the centerline of the grid. Return the attenuator control to its original setting. Where the curve displayed on the oscilloscope now crosses the centerline of the grid are the 3 db points. Measure the bandwidth at the 3 db points for 30, 60, and 90 MHz. The measured bandwidth should be nominal $\pm$ 10%. See figure 5-13.

v. If the specified bandwidths are not obtained, adjust C12, C38, C21, C19, and C27 to broaden the response. Repeat step u if any adjustments are made.

w. Connect the test equipment as shown in figure 5-14.

x. Set the tuner control and signal generator to 90 MHz.

y. Adjust the signal generator for a minimum output level and record the rf voltmeter indication. (Use oscilloscope as visual aid.)

z. Increase the signal generator output level until the indication on the rf voltmeter increases by 10 db. Record the rf voltmeter indication.

aa. Record the siganl generator output level.

ab. Without disturbing the attenuator controls, connect the signal generator directly to combining amplifier A9J1 and set the generator frequency to 21.4 MHz.

ac. Adjust the output level on the signal generator until the indication recorded in step z is obtained. Record the signal generator output level.

ad. Calculate the gain by subtracting the output level recorded in step aa from that of step ac. The gain should not be less than 25 db.

ae. Reconnect the signal generator to connector ANTENNA 1K1J1.

Figure 5-14. I-F Rejection, Image Rejection, and Gain Measurement Procedure, Test Equipment Setup

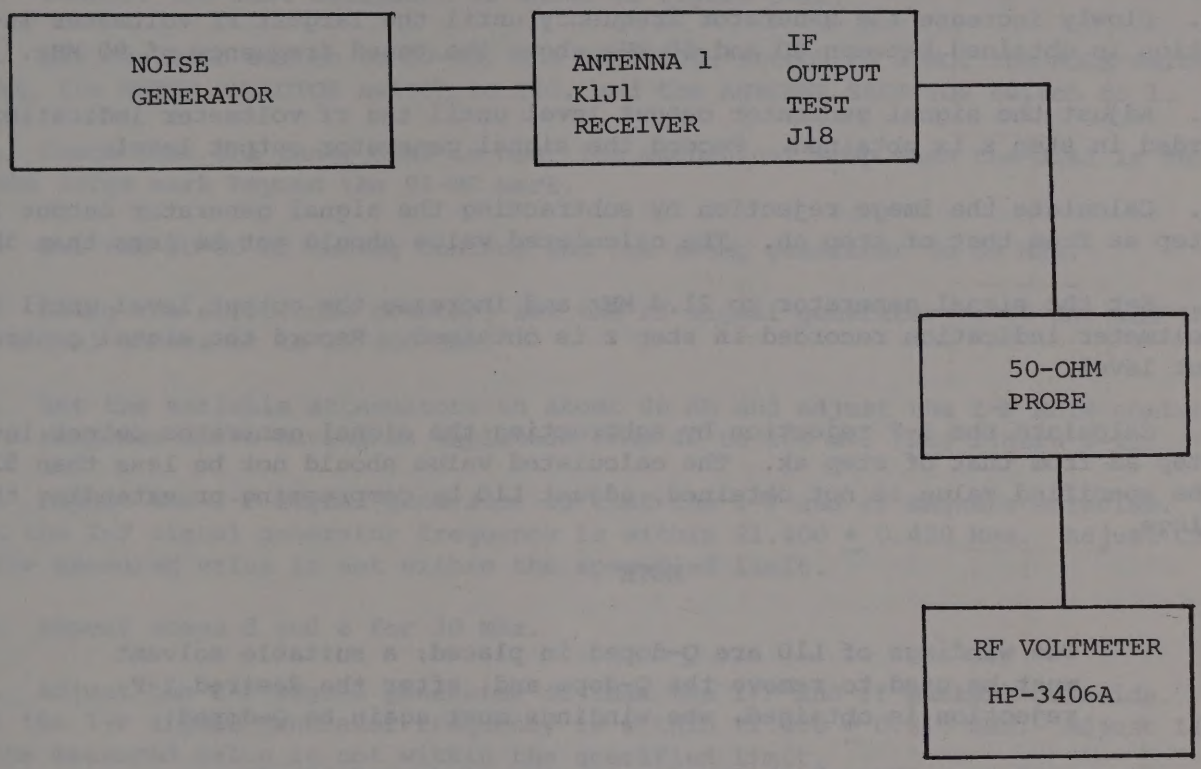


Figure 5-15. Tuner Noise Figure Measurement Procedure, Test Equipment Setup

af. Increase the signal generator output level 50 dbm and set the frequency to 90 MHz.

ag. Slowly increase the generator frequency until the largest rf voltmeter indication is obtained between 40 and 50 MHz above the tuned frequency of 90 MHz.

ah. Adjust the signal generator output level until the rf voltmeter indication recorded in step z is obtained. Record the signal generator output level.

ai. Calculate the image rejection by subtracting the signal generator output level of step aa from that of step ah. The calculated value should not be less than 58 db.

aj. Set the signal generator to 21.4 MHz and increase the output level until the rf voltmeter indication recorded in step z is obtained. Record the signal generator output level.

ak. Calculate the I-F rejection by subtracting the signal generator output level of step aa from that of step ak. The calculated value should not be less than 52 db. If the specified value is not obtained, adjust L10 by compressing or extending the windings.

NOTE

The windings of L10 are Q-doped in placed; a suitable solvent must be used to remove the Q-dope and, after the desired I-F rejection is obtained, whe windings must again be Q-doped.

al. Repeat steps x through ak for frequencies of 60 and 30 MHz.

am. Connect the test equipment as shown in figure 5-15.

an. Set the tuner control to 90 MC.

ao. Adjust the I-F GAIN control for a -43 db indication on the rf voltmeter.

ap. Set the noise generator scale to 20 db. Adjust the noise level input until the rf voltmeter indication increases to -41 db. The noise figure as indicated on the -10 db scale of the noise generator should not exceed 4.5 db. Adjust C3 if an indication within the limits specified cannot be obtained. If adjustment of C3 does not produce the desired results, adjust C27 for more gain.

aq. Reqpeat steps an through ap at 60 MHz for a maximum noise figure of 3.5 db.

ar. Repeat steps an through ap at 30 MHz for a maximum noise figure of 2.5 db.

as. Repeat steps an through ar until the specified values are obtained and adjustments at 30, 60, and 90 MC are not required.

at. Carefully install the band A tuner in the chassis and check the tuning accuracy in accordance with the procedure of paragraph 5-23.

5-23. BAND A TUNING ACCURACY CHECK AND ADJUSTMENT.

a. Connect the test equipment as shown in figure 5-12.

b. Set the BAND switch to 30-90, the BANDWIDTH switch to 3 MC, the MODE switch to AM, the METER SELECTOR switch to SIG, and the ANTENNA SELECTOR switch to 1.

c. Check that the tuner dial is near its mechanical stop when the dial is set to the large mark beyond the 91-MC mark.

d. Set the 30-90 MC tuning control and the sweep generator to 60 MHz.

e. Using the electronic counter, set the rf signal generator to 60 MHz and the I-F signal generator to 21.400 MHz.

f. Set the variable attenuators to about 80 db and adjust the I-F GAIN control for a response curve having an amplitude from 40 to 100 mv. See figure 5-13.

g. Adjust the I-F signal generator so that the I-F and rf markers coincide. Check that the I-F signal generator frequency is within 21.400 $\pm$ 0.420 MHz. Adjust C33 if the measured value is not within the specified limit.

h. Repeat steps d and e for 30 MHz.

i. Adjust the I-F signal generator so that the I-F and rf markers coincide. Check that the I-F signal generator frequency is within 21.400 $\pm$ 0.210 MHz. Adjust L13 if the measured value is not within the specified limit.

j. Repeat steps d and e for 90 MHz.

k. Adjust the I-F signal generator so that the I-F and rf markers coincide. Check that the I-F signal generator frequency is within 21.400 $\pm$ 0.63 MHz. Adjust C33 if the measured value is not within the specified limit.

NOTE

Since interaction exists between L13 and C33, reapeat steps d through k until no further adjustments are necessary and the required accuracy is obtained.

5-24. BAND B TUNER ALIGNMENT.

NOTE

Prior to performing the following procedure, the alignment procedures of paragraphs 5-18 through 5-21 should have been satisfactorily accomplished.

a. Connect the test equipment as shown in figure 5-12.

b. Remove the 90-300 MC tuner control knob on the front panel of the receiver. Remove the snap ring on the pulley drive shaft, the pulley drive, and the pulley drive shaft. Unbolt Band B tuner from the chassis and remove both top covers. Remove the phone jack from the front panel of the receiver and carefully orient Band B tuner so that all adjustment areas are accessible.

c. Check that the tuner dial is at its mechanical stop when the dial is set to 303 MHz.

d. Set the BAND switch to 90-300, the BANDWIDTH switch to 3 MC, the MODE switch to AM, the METER SELECTOR switch to SIG, and the ANTENNA SELECTOR switch to 1.

e. Monitor the voltage at output test point TP3 on the agc amplifier board and adjust the I-F GAIN control for a + 1.2 volt dc indication.

f. Set the tuner control to 300 MHz, the rf signal generator to 300 MHz, and the I-F signal generator to 21.4 MHz.

g. Set the sweep generator for a sweep about a center frequency of 300 MHz.

h. Set C30 fully counterclockwise and adjust C31, C20, C16, C10, and C7 for maximun output.

i. Observing the oscilloscope, adjust the variable attenuators to obtain a detected output between 40 and 100 mv.

j. Adjust C31 until the I-F and rf markers coincide.

k. Set the tuner control, rf signal generator, and the sweep generator to 90 MHz.

l. Adjust L15 until the rf and I-F markers coincide.

m. Repeat steps f through l until the rf and I-F markers are coincident within 2 MHz at 90 and 300 MHz.

n. If the conditions of step m are not met, adjust C20. Repeat steps f through m if C20 is adjusted.

o. Set the rf signal generator, the tuner control, and the sweep generator to 300 MHz.

p. Adjust C7, C10, and C16 for a maximum bandwidth with a minimum loss in amplitude.

q. Measure the bandwidth and repeat step p until a bandwidth of 3 MHz $\pm$ 10% is obtained.

r. Set the rf signal generator, tuner control, and sweep generator to 90 MHz. Set the I-F signal generator to 21.4 MHz.

s. Adjust C7 and C10 for bandwidth of 3 MHz $\pm$ 10%. Check that the I-F and rf markers are coincident within 2 MHz.

t. Recheck the bandwidth at 300 MHz and repeat steps 0 through s if the specified value is not obtained.

u. Maintaining the input at a constant level, slowly increase the tuner control and sweep generator from 90 to 300 MHz. The minimum output should be no less than 1/3 of the maximum amplitude over the specified range.

v. Connect the test equipment as shown in figure 5-14.

w. Set the tuner control and signal generator to 300 MHz.

x. Adjust the signal generator for a minimum output level and record the indication on the rf voltmeter.

y. Adjust the signal generator output level until an increase in deflection is noted on the rf voltmeter.

z. Adjust the signal generator frequency for a maximum indication on the rf voltmeter.

aa. Adjust the signal generator output level until the indication on the rf voltmeter increases 10 db above the indication of step x. Record the rf voltmeter indication.

ab. Increase the signal generator output level 50 db.

ac. Slowly increase the generator frequency by about 43 MHz to the point that results in the largest rf voltmeter indication (use oscilloscope for visual aid).

ad. Adjust C30 until the rf voltmeter indication recorded in step aa is obtained. Record the signal generator output level.

ae. Set the signal generator to the frequency nearest 300 MHz that results in a maximum rf voltmeter indication.

af. Decrease the signal generator output level until the indication recorded in step aa is obtained. Record the signal generator output level.

ag. Calculate the image rejection by subtracting the signal generator output level of step ad from that of step af. The calculated value should not be less than 48 db.

ah. Set the signal generator to 21.4 MHz and increase the output level until the rf voltmeter indication recorded in step aa is obtained. Record the signal generator output level.

ai. Calculate the I-F rejection by subtracting the signal generator output level from step af from that of step ah. The calculated value should not be less than 78 db.

aj. Without distrubing the attenuator controls, connect the signal generator directly to combining amplifier A9J2 and check that the signal generator is set at 21.4 MHz.

ak. Adjust the signal generator output level until the rf voltmeter indication recorded in step aa is obtained. Record the signal generator output level.

al. Calculate the gain by subtracting the output level recorded in step af from that of step ak. The gain should not be less than 24 db.

am. Connect the test equipment as shown in figure 5-15.

an. Set the tuner control to 300 MHz.

ao. Adjust the I-F GAIN control for a -43 db indication on the rf voltmeter.

ap. Set the noise generator scale to 20 db. Adjust the noise level input until the rf voltmeter indication increases to -4 db. The noise figure is indicated on the 0-10 db scale of the noise generator should not exceed 11 db. Adjust C3 if an indication within the limits specified cannot be obtained.

aq. Repeat steps an through ap at 200 MHz for a maximum noise figure of 9 db.

ar. Repeat steps an through ap at 90 MHz for a maximum noise figure of 5 db.

as. Repeat steps an through ar until the specified values are obtained and adjustments at 90, 200, and 300 MHz are not required.

at. Carefully install Band B tuner in the chassis.

au. Install the phone jack on the front panel of the receiver.

av. Check the tuning accuracy of Band B tuner in accordance with the procedure of paragraph 5-25.

5-25. BAND B TUNING ACCURACY CHECK AND ADJUSTMENT.

a. Connect the test equipment as shown in figure 5-12.

b. Set the BAND switch to 90-300, the BANDWIDTH switch to 3 MC, the MODE switch to AM, the METER SELECTOR switch to SIG, and the ANTENNA SELECTOR switch to 1.

c. Check that the tuner dial is near its mechanical stop when the dial is set to the 303-MC mark.

d. Set the 90-300 MC tuning control and the sweep generator to 200 MHz.

e. Using the electronic counter, set the rf signal generator to 200 MHz and the I-F signal generator to 21.400 MHz.

f. Set the variable attenuators to about 80 db and adjust the I-F GAIN control for a visible response curve on the oscilloscope.

g. Adjust the I-F signal generator so that the I-F and rf markers coincide. Check that the I-F signal generator frequency to within 21.400 $\pm$ 1.40 MHz. Adjust C31 if the measured value is not within the specified limit.

h. Repeat steps d and e for 90 MHz.

i. Adjust the I-F signal generator so that the I-F and rf markers coincide. Check that the I-F signal generator frequency is within 21.400 ± 0.630 MHz. Adjust L19 if the measured value is not within the specified limit.

j. Repeat steps d and e for 300 MHz.

k. Adjust the I-F signal generator so that the I-F and rf markers coincide. Check that the I-F signal generator frequency is within 21.400 ± 2.10 MHz. Adjust C31 if the measured value is not within the specified limit.

NOTE

Since interaction exists between L19 and C31, repeat steps d through k until no further adjustments are necessary and the required accuracy is obtained.

5-26. AUTOMATIC GAIN CONTROL AMPLIFIER ADJUSTMENT.

a. Set the BAND switch to 30-90.

b. Set the BANDWIDTH selector switch to 60 KC.

c. Set the MODE switch to AM.

d. Set the I-G GAIN control to the AGC ON position.

e. Set the METER SELECTOR switch to SIG.

f. Set the ANTENNA SELECTOR switch to position 1.

g. Connect a signal generator with a 90 MHz, 2-uv cw signal to the ANTENNA 1 K1J1 connector and tune the 30-90 MC control to 90 MC.

NOTE

The 30-90 MC control may be varied either side of 90 MC to make adjustments.

h. Check that the LEVEL meter pointer just begins to move with the 2-uv signal input. If it does not move, adjust the agc threshold potentiometer R1 of the agc amplifier board until the meter pointer begins to move.

i. With a 50-percent modulated input signal, gradually increase the signal level while observing the audio output. If the receiver overloads at any level

below 10 mv, the settings of the agc potentiometers of the agc amplifier board should be checked.

NOTE

Normally, receiver overloading with a 10-mv input is an indication that the agc 1 voltage does not reach its maximum. The agc 1 gain potentiometer R16 and the agc 1 threshhold potentiometer R18 should be adjusted so that a -10 volt output is obtained at TP3 of the agc amplifier board. Adjustment of R16 or R18 will affect the noise figure. Repeat the noise figure measurement procedures of paragraphs 5-22 and 5-24.

j. Repeat steps h and i with a 300-kc bandwidth.

k. Set the BAND switch to 90-300 and repeat steps h, i and j with an input signal of 300 MC. Repeat step i if the agc amplifier potentiometers were adjusted.

5-27. TUNING METER CHECK AND ADJUSTMENT.

a. Set the BAND switch to 30-90.

b. Set the BANDWIDTH switch to 60 KC.

c. Set the 30-90 MC tuning control to 60 MC.

d. Set the ANTENNA SELECTOR switch to position 1.

e. Connect a signal generator with a 60-MHz cw output to the ANTENNA 1 K1J1 connector so that a 21.4 MHz output is obtained at the I-F OUTPUT TEST jack J18 (connect a frequency counter to the I-F OUTPUT TEST jack).

f. Check that the TUNING meter pointer remains centered.

g. Decrease the signal generator output to the noise level and check that the TUNING meter pointer remains centered.

h. Vary the signal generator frequency slightly above and slightly below 21.4 MC and check that the meter indicates the Off-frequency tuning in both directions. If the symmetry is excessively bad, adjustment of the fm discriminators of the discriminator unit is required (refer to paragraph 5-13).

i. Set the BANDWIDTH switch to 300 KC and repeat steps f, g, and h.

j. Set the BANDWIDTH switch to 3 MC and repeat steps f, g, and h.

NOTE

Because of the wide bandwidth, a slight offsetting of the TUNING meter pointer during 3-MC bandwidth operation can be expected.

k. Set the METER SELECT switch to VID. Check that the TUNING meter responds to adjustment of the AUD/VID GAIN control.

5-28. BFO FREQUENCY SETTING ADJUSTMENT.

a. Connect the equipment as shown in figure 5-16.

b. Set the signal generator for a 21.4 MHz ± 1 KC 0 dbm, BANDWIDTH to 60 KHz signal and check that the electronic counter indicates the specified frequency.

c. Set the MODE selector switch to CW and the BFO FREQ control to its mid-position.

d. Viewing, or listening to, the audio output, tune L4 of the beat frequency oscillator until a zero beat is obtained.

e. Connect the electronic counter to VIDEO OUTPUT connector J2 and set the AUD/VID GAIN control to its mid-position.

f. Vary the BFO FREQ control; a 6-kc signal (minimum) on each side of the zero beat should be obtained.

5-29. COR ADJUSTMENT.

a. Terminate the ANTENNA 1 connector K1J1 with a 50-ohm termination.

b. Connect an oscilloscope to TP1 of the cor/audio amplifier board.

c. Set the I-F GAIN control to the AGC ON position.

d. Set the MODE selector switch to AM.

e. Set the BAND switch to 30-90.

f. Set the BANDWIDTH selector switch to 60 KC.

g. Set the ANTENNA SELECTOR switch to position 1.

h. Tune to 30-90 MC control through the tuning range until a maximum pulse rate is obtained.

i. Adjust the cor A sensitivity potentiometer R38 of the cor/audio amplifier board until the COR indicator light just goes out (decrease the sensitivity so that the light does not come on "on noise".)

j. Tune the 30-90 MC control through the tuning range and check that the COR indicator light remains off. If it should come on, readjust R38 until the light goes off.

k. Connect a signal generator with a 90-MHz output to the ANTENNA 1 connector K1J1.

l. Tune the 30-90 MC tuning control to 90 MHz.

m. Vary the signal generator output level and note the signal level required to cause the COR indicator light to come on; a signal level less than 0.5 uv should be obtained. If it is not obtained, repeat steps i to m.

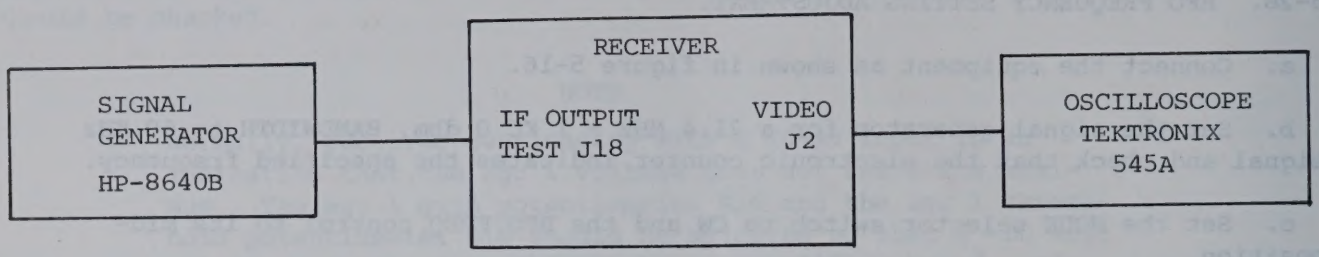


Figure 5-16. BFO Frequency Setting Adjustment Procedure, Test Equipment Setup

n. Vary the signal generator output level and note the signal level change required to cause the COR indicator light to go off and to come on. If the off-to-on signal change is more than 1 db, adjust the hysteresis adjustment potentiometer R12.

NOTE

The adjustment of R12 will affect the setting of the cor A sensitivity potentiometer R38. Readjustment of both these potentiometers is then required until a sensitivity better than 0.5 uv cannot be obtained, adjust, as necessary, the 500-KC filter (paragraph 5-14), the agc amplifier (paragraph 5-26), the Band A tuner (paragraphs 5-22 and 5-23), the Band B tuner (paragraphs 5-24 and 5-25), and the I-F amplifier (paragraph 5-20).

o. Set the BANDWIDTH selector switch to 300 KC.

p. Terminate the ANTENNA 1 connector with a 50-ohm termination.

q. Adjust the cor bandwidth sensitivity potentiometer R5 of the bandwidth selector unit until the COR indicator light just goes off (decrease the sensitivity so that the light does not come on "on noise".)

r. Tune the 30-90 MC control through the tuning range and check that the COR indicator light does not come on.

s. Repeat steps k, 1, and m.

t. Set the BAND switch to 90-300 and the BANDWIDTH selector switch to 60 KC.

u. Terminate the ANTENNA 1 connector K1J1 with a 50-ohm termination.

v. Tune the 90-300 MC control through the tuning range until a maximum pulse rate is obtained.

w. Adjust the cor B sensitivity adjustment potentiometer R8 of the cor/audio amplifier board until the COR indicator light just goes off (decrease the sensitivity so that the COR light does not come on "on noise".)

x. Tune the 90-300 MC control through the tuning range and check that the COR indicator light remains off. If it should come on, adjust R8 until the light goes off.

y. Connect a signal generator with a 200-MHz output to the ANTENNA 1 connector K1J1.

z. Tune the 90-300 MC control to 200 MHz.

aa. Vary the signal generator output level and not the level required to cause the COR indicator light to come on. A signal level less than 0.8 uv should be

obtained; if it is not obtained, repeat the procedure from step u. In addition, check hysteresis in accordance with step n.

NOTE

Adjustment of R12 will affect the setting of both the cor A sensitivity potentiometer R38 and the cor B sensitivity potentiometer R8. Repeat steps a thrugh aa if R12 is adjusted.

ab. Set the BANDWIDTH selector switch to 300 KC and repeat step aa.

5-30. RECEIVER UNIT MINIMUM PERFORMANCE TEST.

5-31. PURPOSE.

a. The purpose of this test is to determine if the R-1283 receiver can meet minimum performance standards as required by measuring sensitivity, I-F bandwidth, and noise figure.

5-32. TEST EQUIPMENT REQUIRED.

a. RF sweep generator - Texscan VS-40.

b. RF signal generator - HP-8640B.

c. Oscilloscope - Tektronix 545A.

d. RF voltmeter - HP-3406A.

e. Noise generator - Kay Electric 3000.

f. Crystal detector - Aertech D128.

5-33. SENSITIVITY TEST.

a. Connect test equipment as shown in figure 5-17.

(1) Set receiver controls in following positions:

(a) Power switch to ON.

(b) AUD/VID GAIN to maximum clockwise.

(c) MODE switch to AM.

(d) BANDWIDTH to 3 MHz

(e) I-F GAIN to AGC ON.

(f) BAND switch to 30-90.

(2) Adjust signal generator to 30 MHz, -50 dbm, 50-percent amplitude modulated at 1000 Hz.

(3) Adjust receiver tuning control to 30 MHz, a 1000 Hz waveform should appear on the scope.

(4) Reduce signal generator output until 1000 Hz waveform is not visible (noise only). Increase signal generator until 1000 Hz waveform is visible. Signal generator output should be minimum -98 dbm.

(5) Repeat steps 2-4 for 60 MHz and 90 MHz. Readjustment of tuner control may be necessary.

(6) Place BAND switch to 90-300, repeat steps 2-4 for 90, 200, and 300 MHz.

5-34. I-F BANDWIDTH.

a. Connect test equipment as shown in figure 5-18.

(1) Set receiver controls in the following positions:

(a) POWER switch to ON.

(b) MODE switch to AM.

(c) BANDWIDTH to 3 MHz.

(d) I-F GAIN to manual clockwise.

(e) BAND to 30-90 and tuner control to 60 MHz.

(2) Set sweep generator for a sweep about a center frequency of 60 MHz. Adjust sweep generator signal level for a display on the oscilloscope not exceeding 100 mv. (Adjust I-F GAIN control if waveform is distorted).

(3) Check bandwidth at 3 db points, bandwidth should be 3 MHz $\pm$ 10%.

(4) Set BAND to 90-300, frequency to 200 MHz. Repeat steps 2-3.

5-35. NOISE FIGURE TEST.

a. Connect test equipment as shown in figure 5-19.

(1) Set tuner control to 30 MHz, BANDWIDTH to 300 KC.

(2) Adjust the I-F GAIN control for a -43 db indication on the rf voltmeter.

see sub c-

(3) Adjust noise level input until the rf voltmeter indication increases to -40 db. The noise figure should not exceed 2.5 db.

(4) Repeat steps 2-3 at 60 MHz for a maximum noise figure of 3.5 db.

(5) Repeat steps 2-3 at 90 MHz for a maximum noise figure of 4.5 db.

(6) Repeat steps 2-3 at 90 MHz (Band B) for a maximum noise figure of 5 db.

(7) Repeat steps 2-3 at 200 MHz for a maximum noise figure of 9 db.

(8) Repeat steps 2-3 at 300 MHz for a maximum noise figure of 11 db.

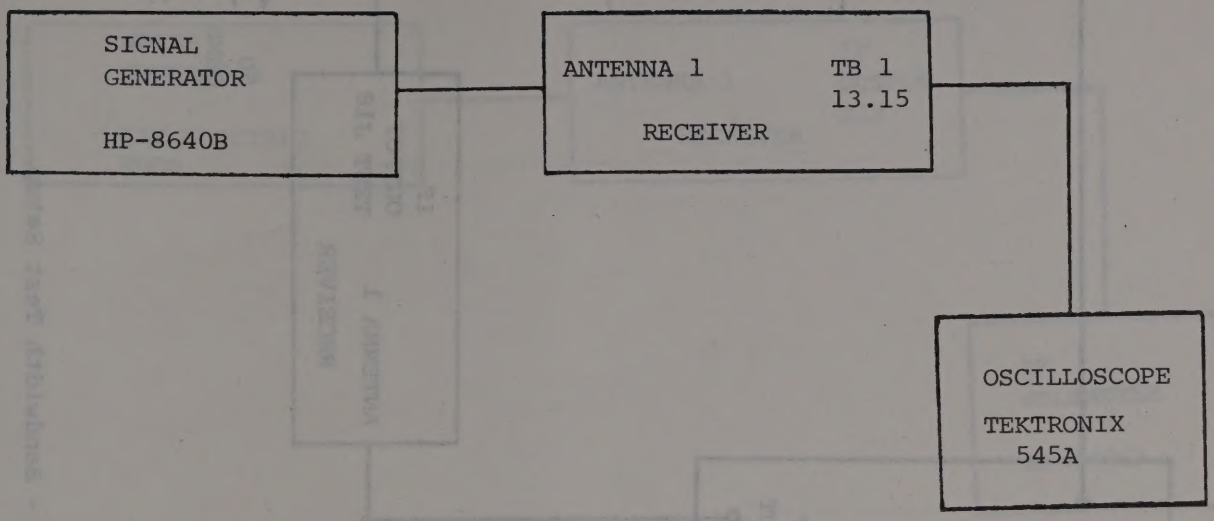


Figure 5-17. Receiver Unit Minimum Performance - Sensitivity Test Setup

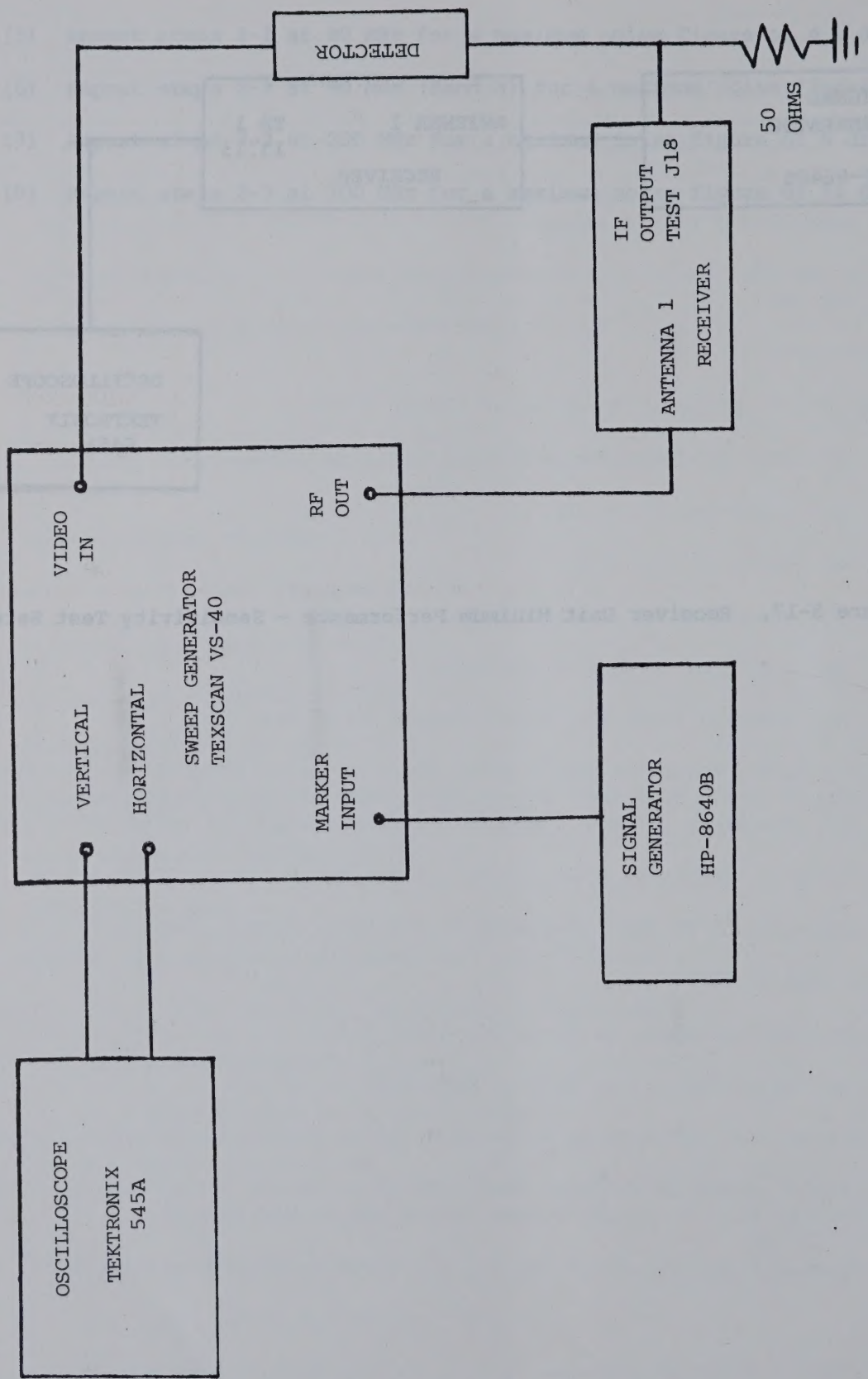


Figure 5-18. Receiver Unit Minimum Performance - Bandwidth Test Setup

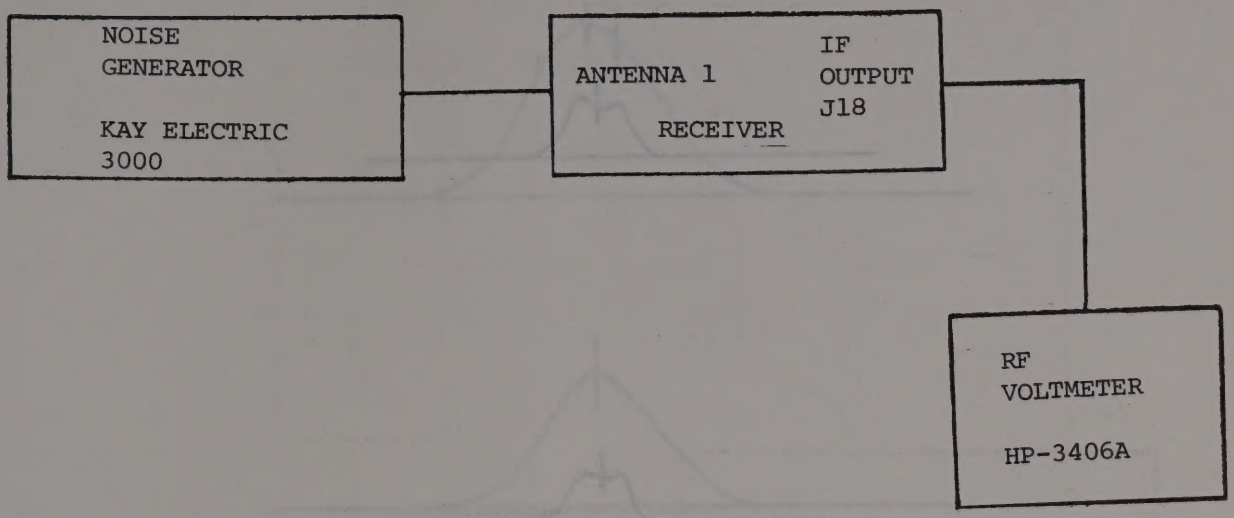


Figure 5-19. Receiver Unit Minimum Performance - Noise Figure Test Setup

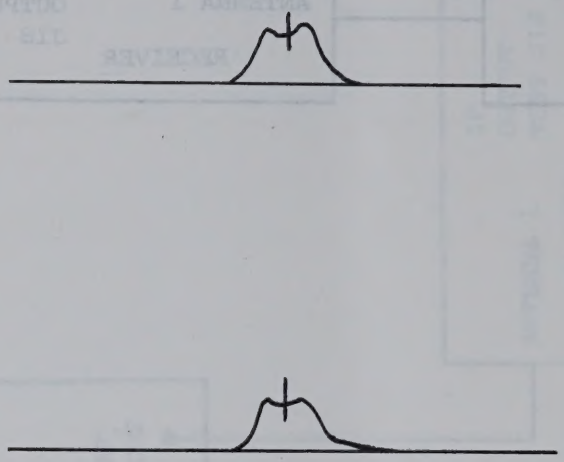


Figure 5-20. I-F Amplifier with 4 MHz Bandwidth
Receiver Serial No. 14/Module Serial No. 127

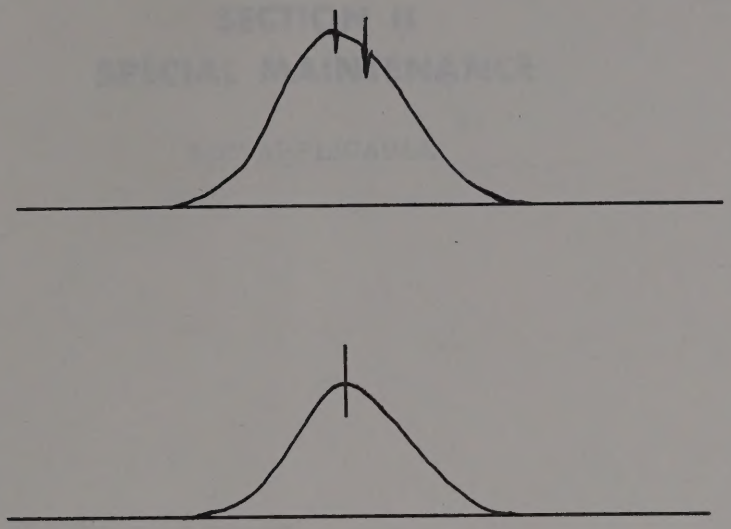
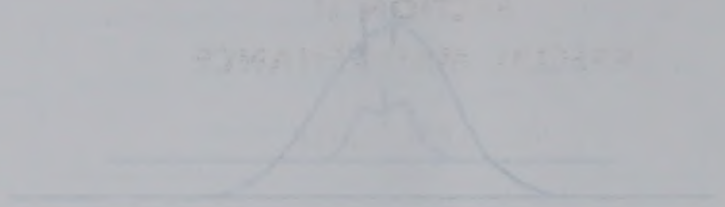


Figure 5-21. RF Tuner with 3 MHz Bandwidth
Receiver Serial No. 14/Module Serial No. 15



SECTION II
SPECIAL MAINTENANCE

NOT APPLICABLE

PTER 6
DIAGRAMS

pter is to provide the circuit diagrams, voltage-
or servicing the receiver.

subassemblies and printed-circuit boards of the
connecting cabling of the subassemblies is also
m shows the location of circuit test points (repre-
ir reference designations. When applicable, the
ustrated on the diagram. Voltage and resistance
licable. Unless otherwise noted, all voltage
l resistance readings are measured using the
receiver is shown in heavier-weight lines, with

terconnecting cabling of the subassemblies and
natic circuit diagrams of the less complex sub-
The order of the remaining circuit diagrams is
ircuits given in Chapter 4.

electrical and electronic symbols, and the ref-
cordance with specifications MIL-STD-12,
ss otherwise specified, all resistor values
ofarads, and all inductor values are in micro-

CHAPTER 6
CIRCUIT DIAGRAMS

6-1. INTRODUCTION. The purpose of this chapter is to provide the circuit diagrams, voltage-resistance charts, and waveform data required for servicing the receiver.

6-2. SCOPE. Circuit diagrams for each of the subassemblies and printed-circuit boards of the receiver are included in this chapter. The interconnecting cabling of the subassemblies is also shown. When applicable, each schematic diagram shows the location of circuit test points (represented by 3/16-inch-diameter black dots) and their reference designations. When applicable, the waveform data obtainable at the test points is illustrated on the diagram. Voltage and resistance charts are also shown on the diagram, when applicable. Unless otherwise noted, all voltage readings are taken with respect to ground and all resistance readings are measured using the R×1000 scale. The signal flow path through the receiver is shown in heavier-weight lines, with arrows to indicate the direction of flow.

6-3. ARRANGEMENT. The panel wiring and interconnecting cabling of the subassemblies and boards are shown on the first diagram; the schematic circuit diagrams of the less complex subassemblies are also included on this diagram. The order of the remaining circuit diagrams is the same as the signal-flow presentation of the circuits given in Chapter 4.

6-4. GENERAL NOTES. The abbreviations, the electrical and electronic symbols, and the reference designations used in this chapter are in accordance with specifications MIL-STD-12, MIL-STD-15, and MIL-STD-16, respectively. Unless otherwise specified, all resistor values shown are in ohms, all capacitor values are in picofarads, and all inductor values are in microhenries.

TECHNICAL MANUAL

ILLUSTRATED PARTS BREAKDOWN

RADIO RECEIVER R-1283/GRC

(AIRBORNE INSTRUMENTS LABORATORY)

Contract AF 30(635)-33947

PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE

15 NOVEMBER 1966

CHANGE 4 23 FEBRUARY 1975

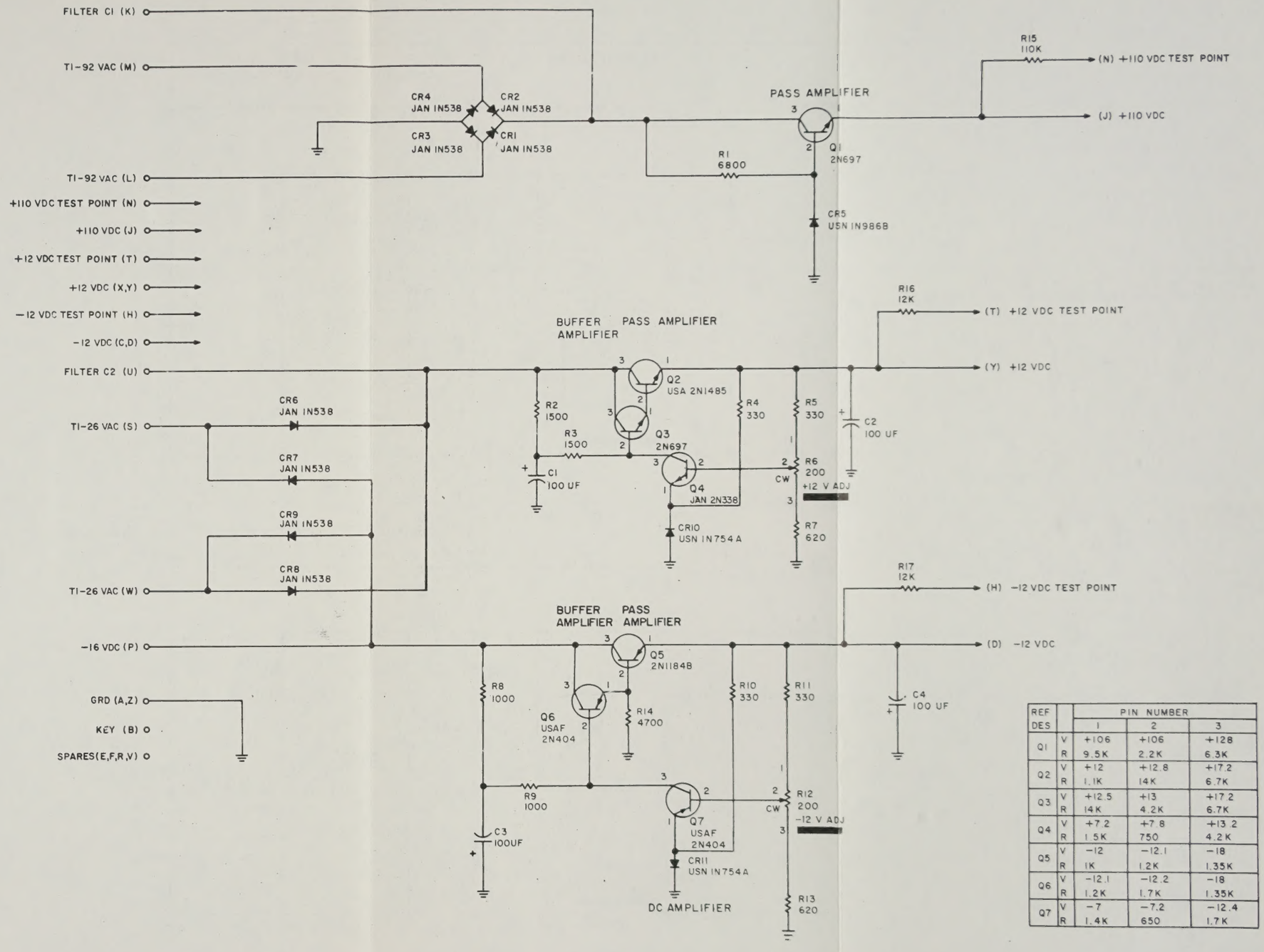
S3 BAND	
POSITION	FUNCTION
1	30-90 MC
2	90-300 MC

S4 MODE	
POSITION	FUNCTION
1	CW
2	FM
3	AM
4	PULSE

AIOSI BANDWIDTH SELECTOR	
POSITION	FUNCTION
1	60 KC
2	300 KC
3	3 MC

NOTE:
SWITCH S6 IS ACTIVATED TO AUTOMATIC WHEN R3 IS SET FULLY CLOCKWISE

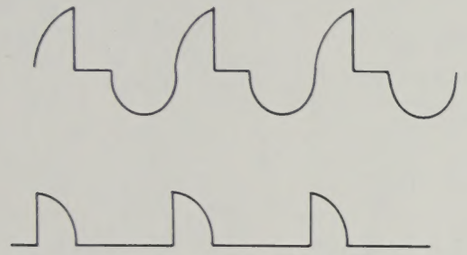
Figure 6-1. Radio Receiver R-1283/GRC, Schematic Diagram

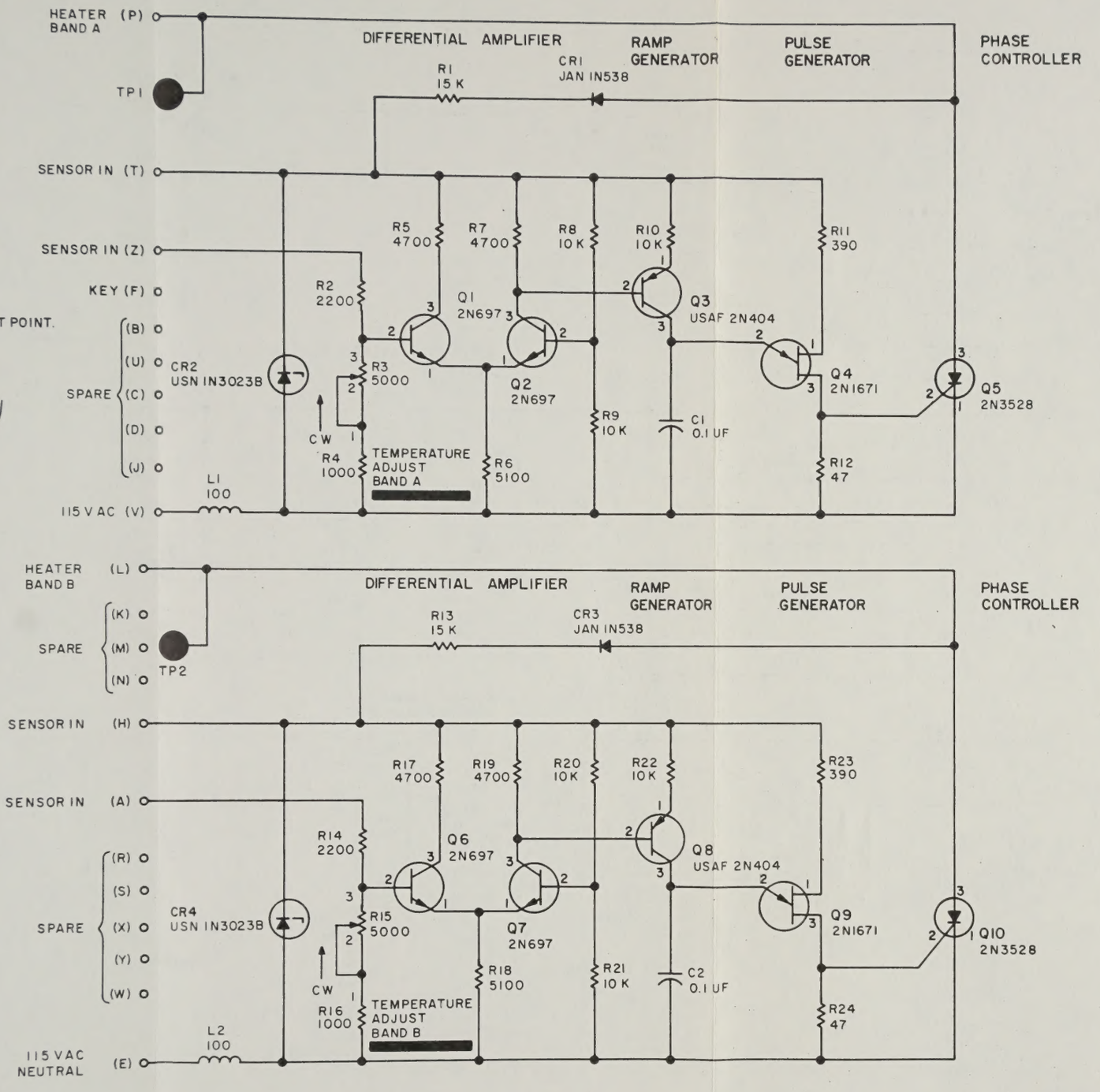


REF DES		PIN NUMBER 1	2	3
Q1	V	+106	+106	+128
	R	9.5K	2.2K	6.3K
Q2	V	+12	+12.8	+17.2
	R	1.1K	14K	6.7K
Q3	V	+12.5	+13	+17.2
	R	14K	4.2K	6.7K
Q4	V	+7.2	+7.8	+13.2
	R	1.5K	750	4.2K
Q5	V	-12	-12.1	-18
	R	1K	1.2K	1.35K
Q6	V	-12.1	-12.2	-18
	R	1.2K	1.7K	1.35K
Q7	V	-7	-7.2	-12.4
	R	1.4K	650	1.7K

Figure 6-2. Power Supply Board A3, Schematic Diagram

WAVEFORMS AT TP1 AND TP2. WHEN ONE WAVEFORM APPEARS AT ONE TEST POINT, THE OTHER WAVEFORM APPEARS AT THE OTHER TEST POINT.

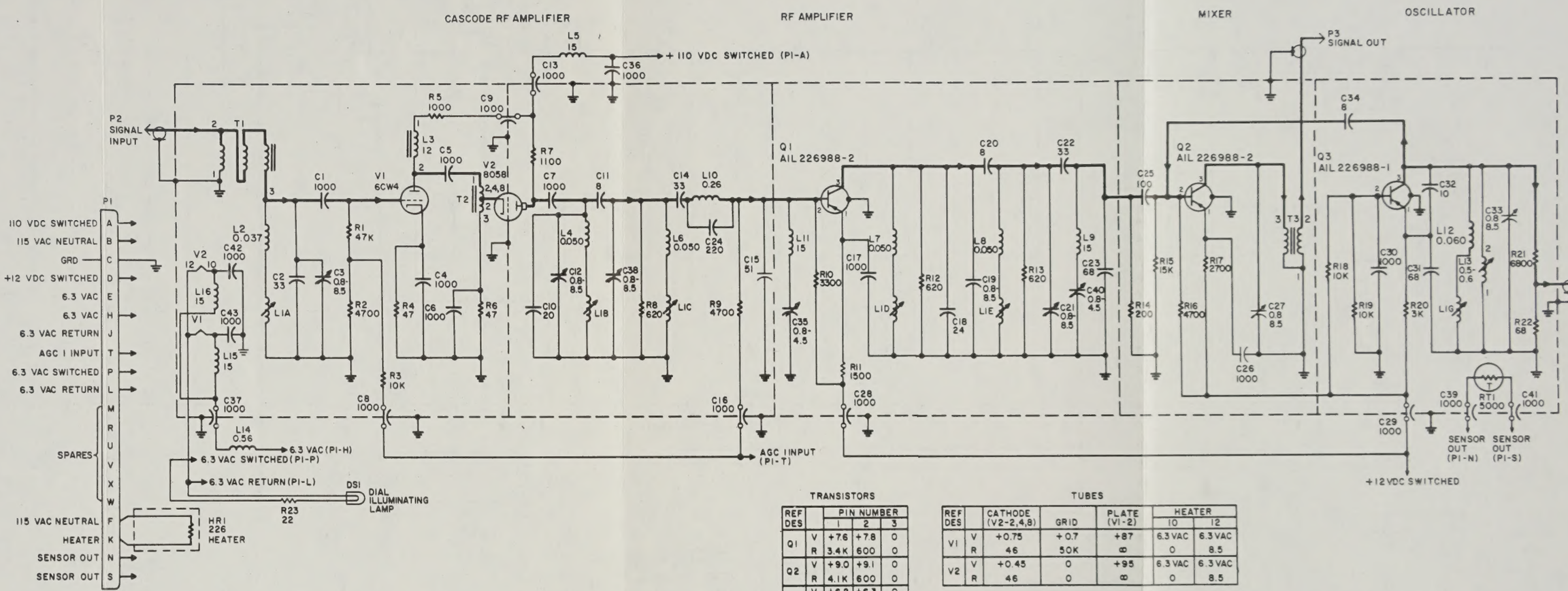




REF DES		PIN NUMBER 1	2	3
Q1	V	+1.9	+0.75	+2.7
	R	3.1 K	4 K	4.4 K
Q2	V	+1.9	+1.65	+2.8
	R	3.1 K	6.5 K	6 K
Q3	V	+2.8	+2.85	+0.75
	R	15.5 K	6 K	∞
Q4	V	+3.2	+0.75	+0.05
	R	2.7 K	∞	39
Q5	V	0	+0.05	+10
	R	0	39	∞
Q6	V	+0.95	+1	+2.4
	R	3 K	4.2 K	4.8 K
Q7	V	+0.95	+1.25	+1.35
	R	3 K	6.4 K	6 K
Q8	V	+0.8	+1.35	+0.95
	R	15.5 K	6 K	∞
Q9	V	+2.5	+0.95	+0.05
	R	2.7 K	∞	2.7 K
Q10	V	0	0	−10.8
	R	2	35	∞

NOTE:
MEASUREMENTS MADE WITH RESPECT TO AC COMMON: LUG 4 FOR Q1 THROUGH Q5, AND LUG 8 FOR Q6 THROUGH Q10.

Figure 6-3. Heater Control Board A7, Schematic Diagram



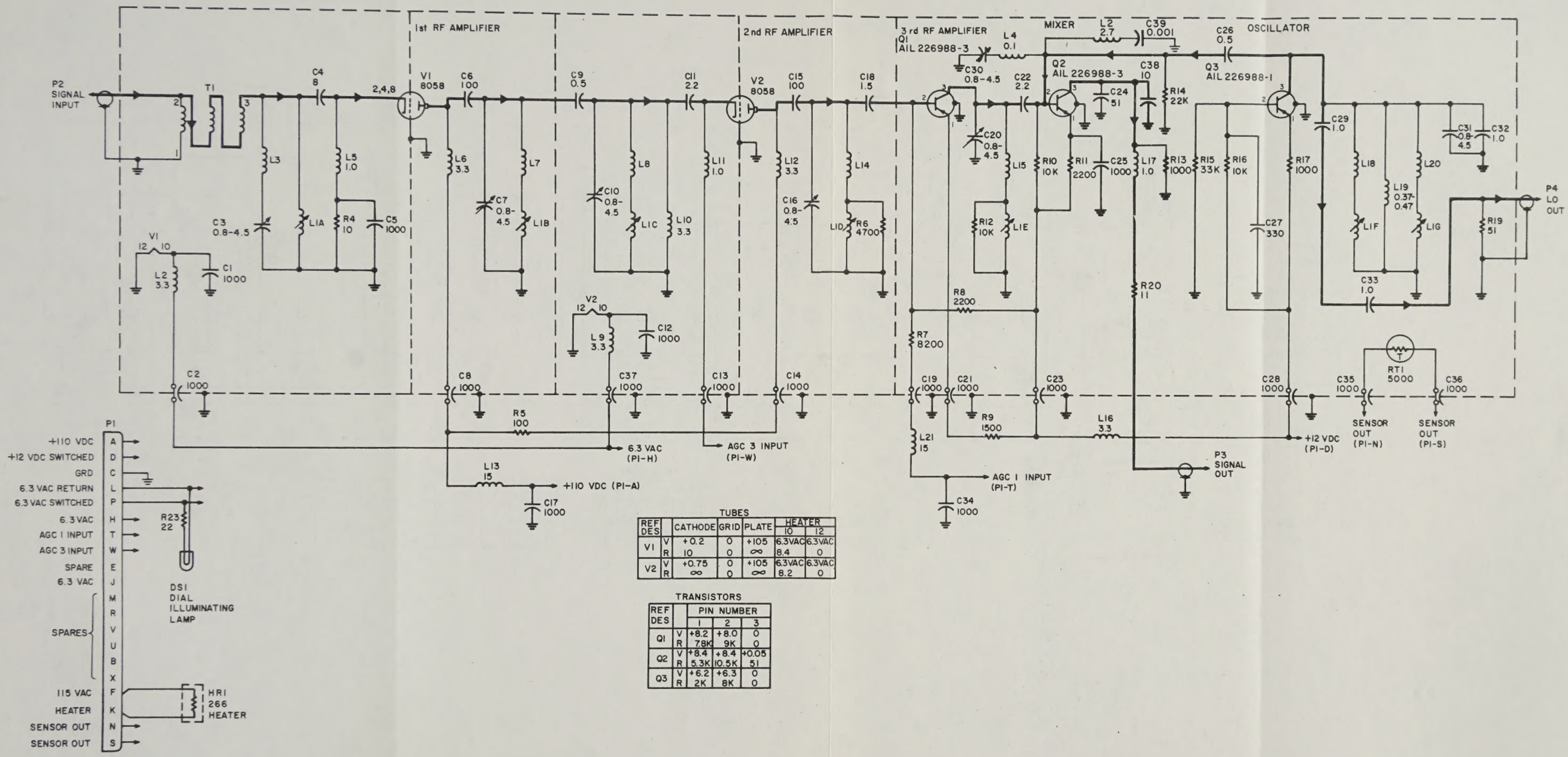
TRANSISTORS

REF DES		PIN NUMBER 1	2	3
Q1	V	+7.6	+7.8	0
	R	3.4K	600	0
Q2	V	+9.0	+9.1	0
	R	4.1K	600	0
Q3	V	+6.2	+6.3	0
	R	5K	600	0

TUBES

REF DES		CATHODE (V2-2,4,8)	GRID	PLATE (V1-2)	HEATER 10	HEATER 12
V1	V	+0.75	+0.7	+87	6.3 VAC	6.3 VAC
	R	46	50K	∞	0	8.5
V2	V	+0.45	0	+95	6.3 VAC	6.3 VAC
	R	46	0	∞	0	8.5

Figure 6-4. Band A Tuner A1, Schematic Diagram



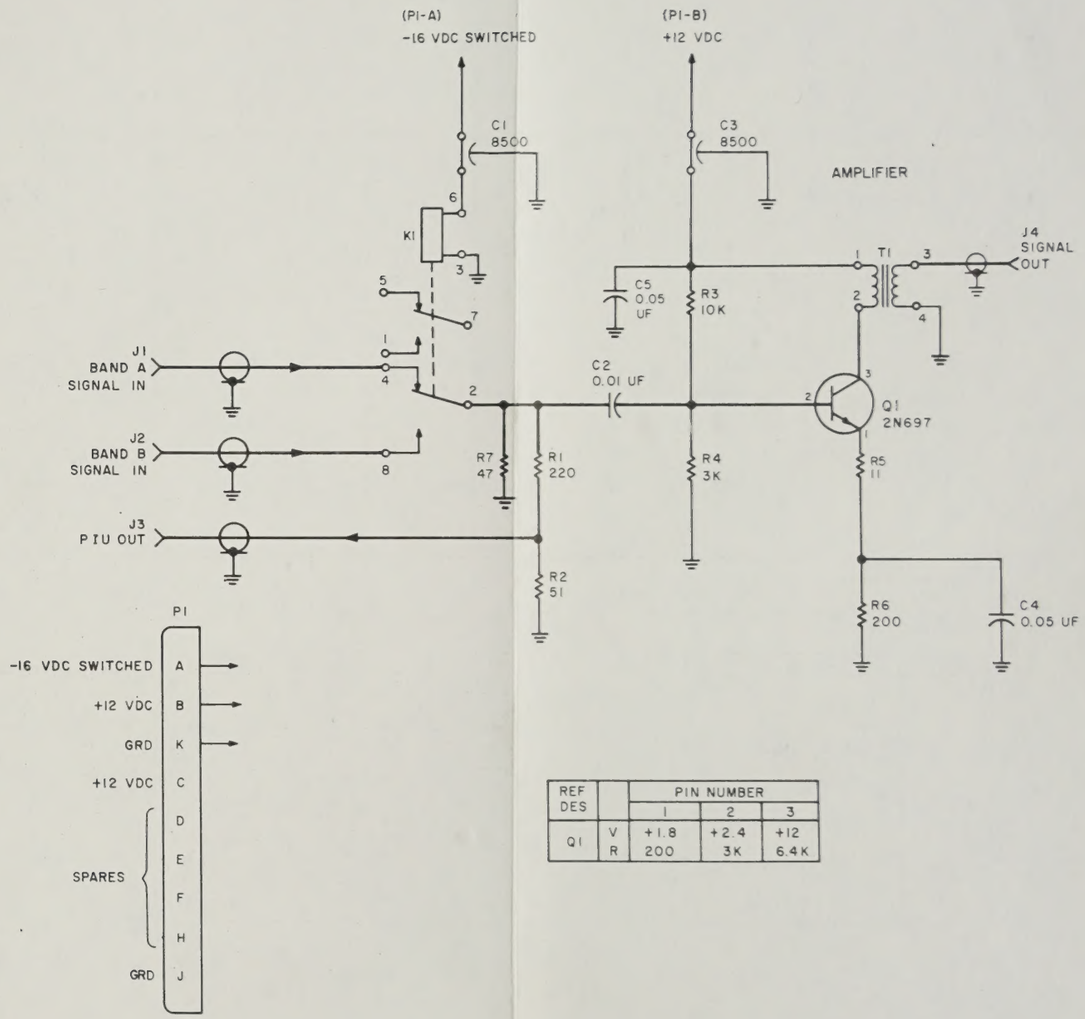
TUBES

REF DES		CATHODE	GRID	PLATE	HEATER 10	HEATER 12
V1	V	+0.2	0	+105	6.3VAC	6.3VAC
	R	10	0	∞	8.4	0
V2	V	+0.75	0	+105	6.3VAC	6.3VAC
	R	∞	0	∞	8.2	0

TRANSISTORS

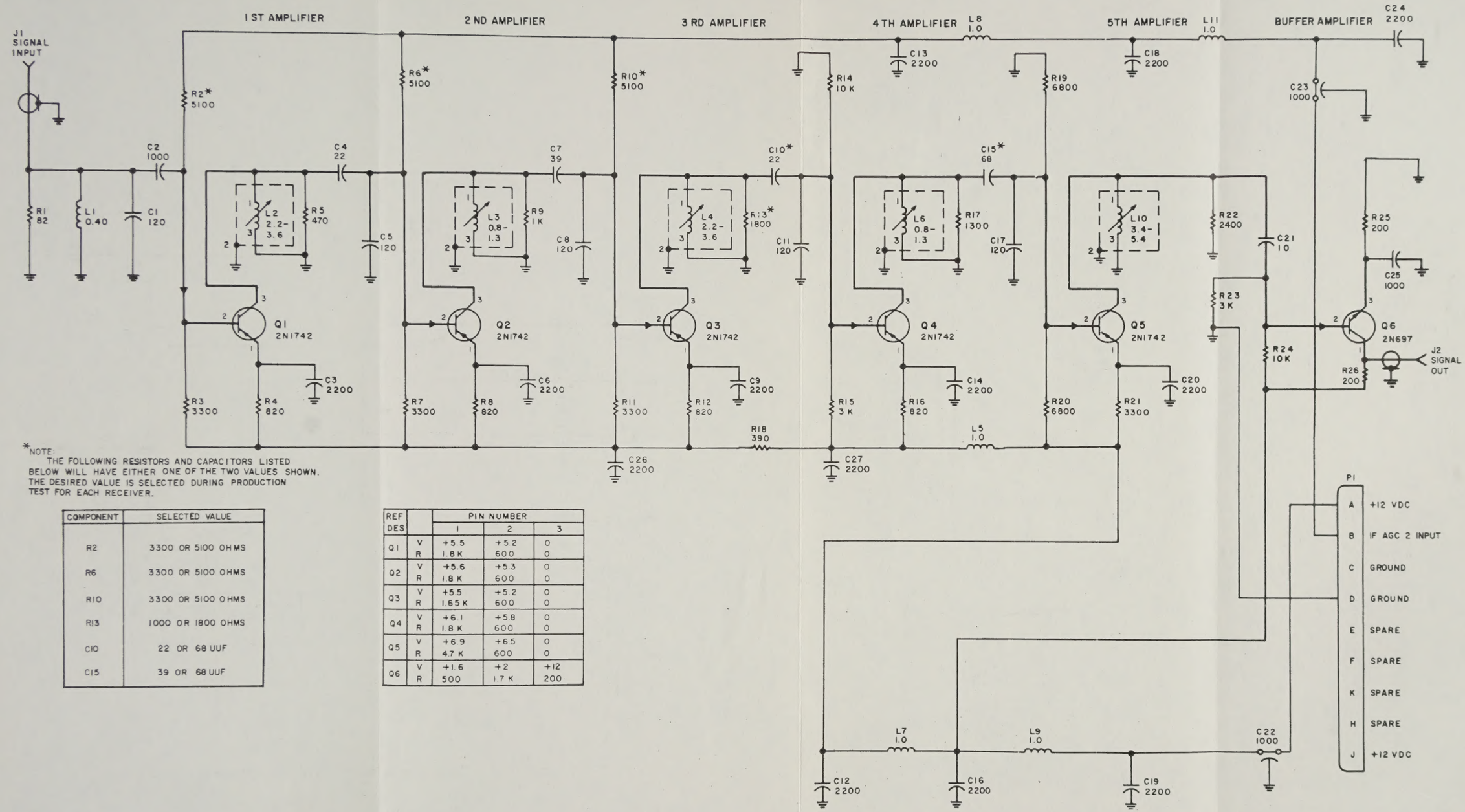
REF DES		PIN NUMBER 1	2	3
Q1	V	+8.2	+8.0	0
	R	7.8K	9K	0
Q2	V	+8.4	+8.4	+0.05
	R	5.3K	10.5K	51
Q3	V	+6.2	+6.3	0
	R	2K	8K	0

Figure 6-5. Band B Tuner A2, Schematic Diagram



REF DES		PIN NUMBER		
		1	2	3
Q1	V	+1.8	+2.4	+12
	R	200	3K	6.4K

Figure 6-6. Combining Amplifier Unit A9, Schematic Diagram



*NOTE:
THE FOLLOWING RESISTORS AND CAPACITORS LISTED BELOW WILL HAVE EITHER ONE OF THE TWO VALUES SHOWN. THE DESIRED VALUE IS SELECTED DURING PRODUCTION TEST FOR EACH RECEIVER.

COMPONENT	SELECTED VALUE
R2	3300 OR 5100 OHMS
R6	3300 OR 5100 OHMS
R10	3300 OR 5100 OHMS
R13	1000 OR 1800 OHMS
C10	22 OR 68 UUF
C15	39 OR 68 UUF

REF DES		PIN NUMBER		
		1	2	3
Q1	V	+5.5	+5.2	0
	R	1.8K	600	0
Q2	V	+5.6	+5.3	0
	R	1.8K	600	0
Q3	V	+5.5	+5.2	0
	R	1.65K	600	0
Q4	V	+6.1	+5.8	0
	R	1.8K	600	0
Q5	V	+6.9	+6.5	0
	R	4.7K	600	0
Q6	V	+1.6	+2	+12
	R	500	1.7K	200

Figure 6-7. I-F Amplifier Unit AR1, Schematic Diagram

REF DES		PIN NUMBER		
		1	2	3
Q1	V	+1.8	+2.4	+11.8
	R	200	2.4K	2.8K
Q2	V	+2	+2.6	+11.9
	R	200	2.4K	2.8K
Q3	V	+1.8	+2.6	+11.9
	R	200	2.4K	2.8K
Q4	V	+2.1	+2.8	+11.9
	R	200	2.8K	2.8K

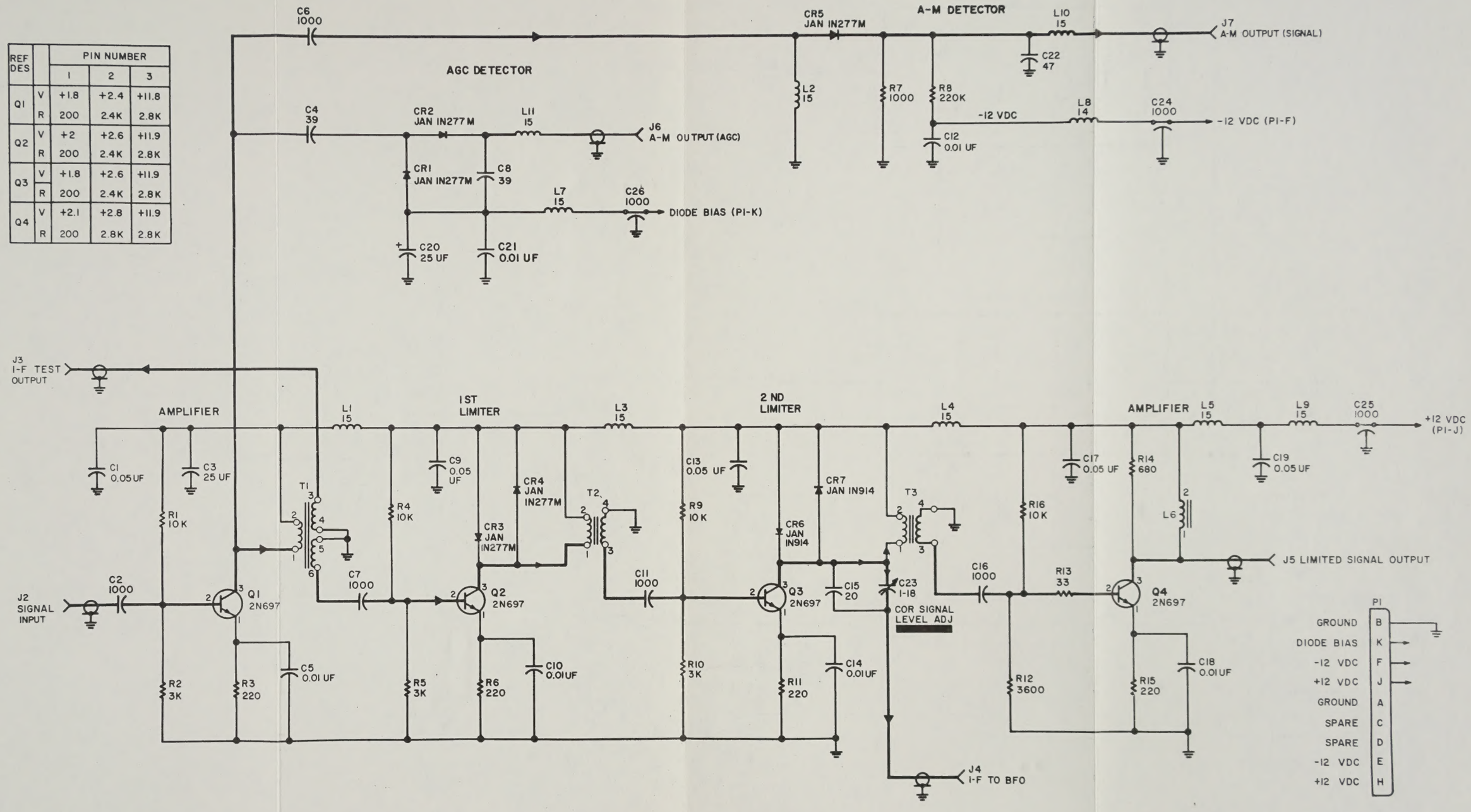


Figure 6-8. Limiter Unit AR3, Schematic Diagram

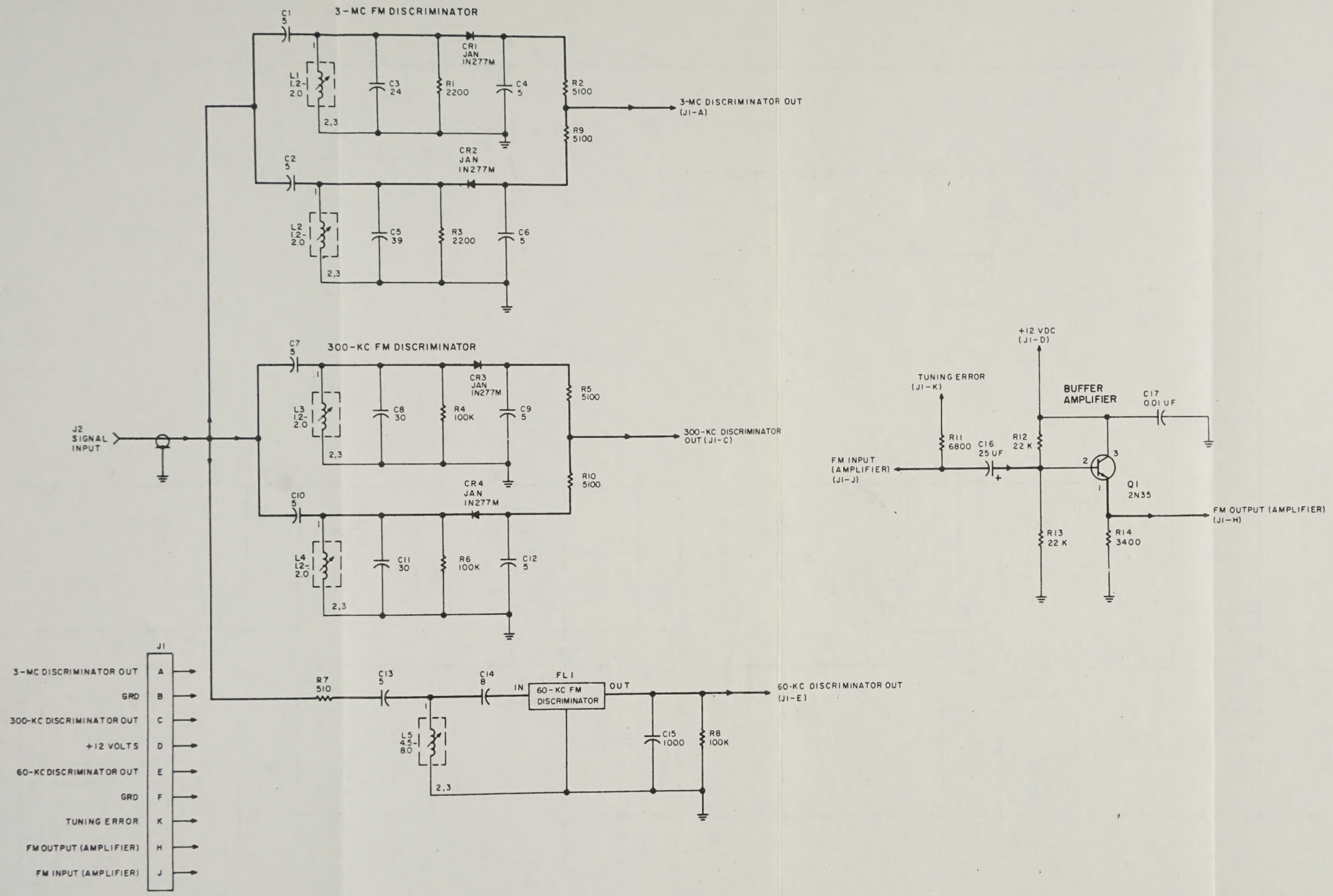


Figure 6-9. Discriminator Unit A6, Schematic Diagram

REF DES		PIN NUMBER 1	2	3
Q1	V	+1.8	+2.5	+12
	R	200	3 K	6 K
Q2	V	+0.15	0	+10
	R	∞	0	7.2 K
Q3	V	0	0	-0.05
	R	3.4 K	2.2 K	3.3 K
Q4	V	0	0	-0.05
	R	1.5 K	1.4 K	3.3 K
Q5	V	0	0	0
	R	1.5 K	1.8 K	6 K
Q6	V	+12	+12	+0.2
	R	6.2 K	6.9 K	∞

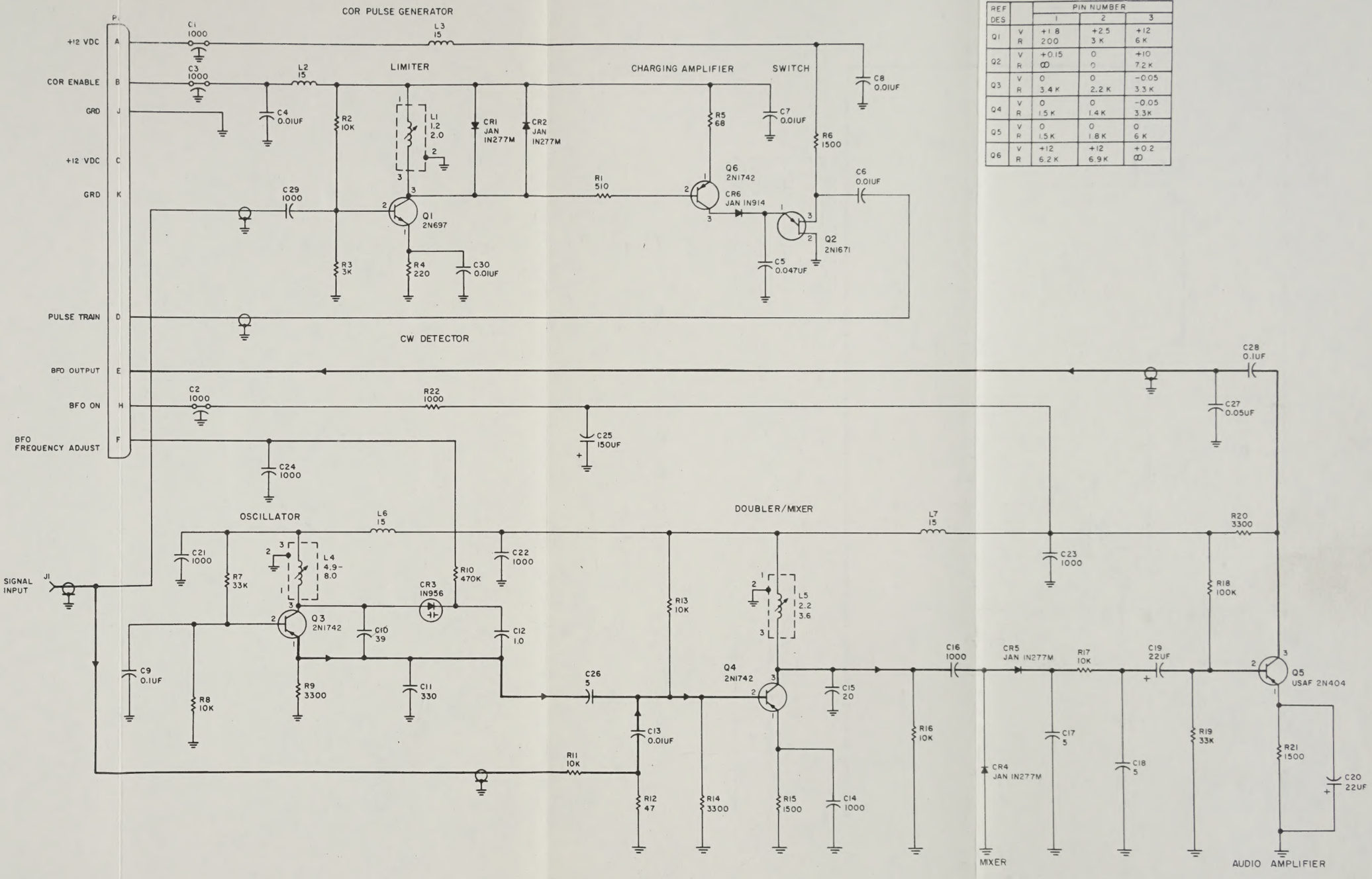
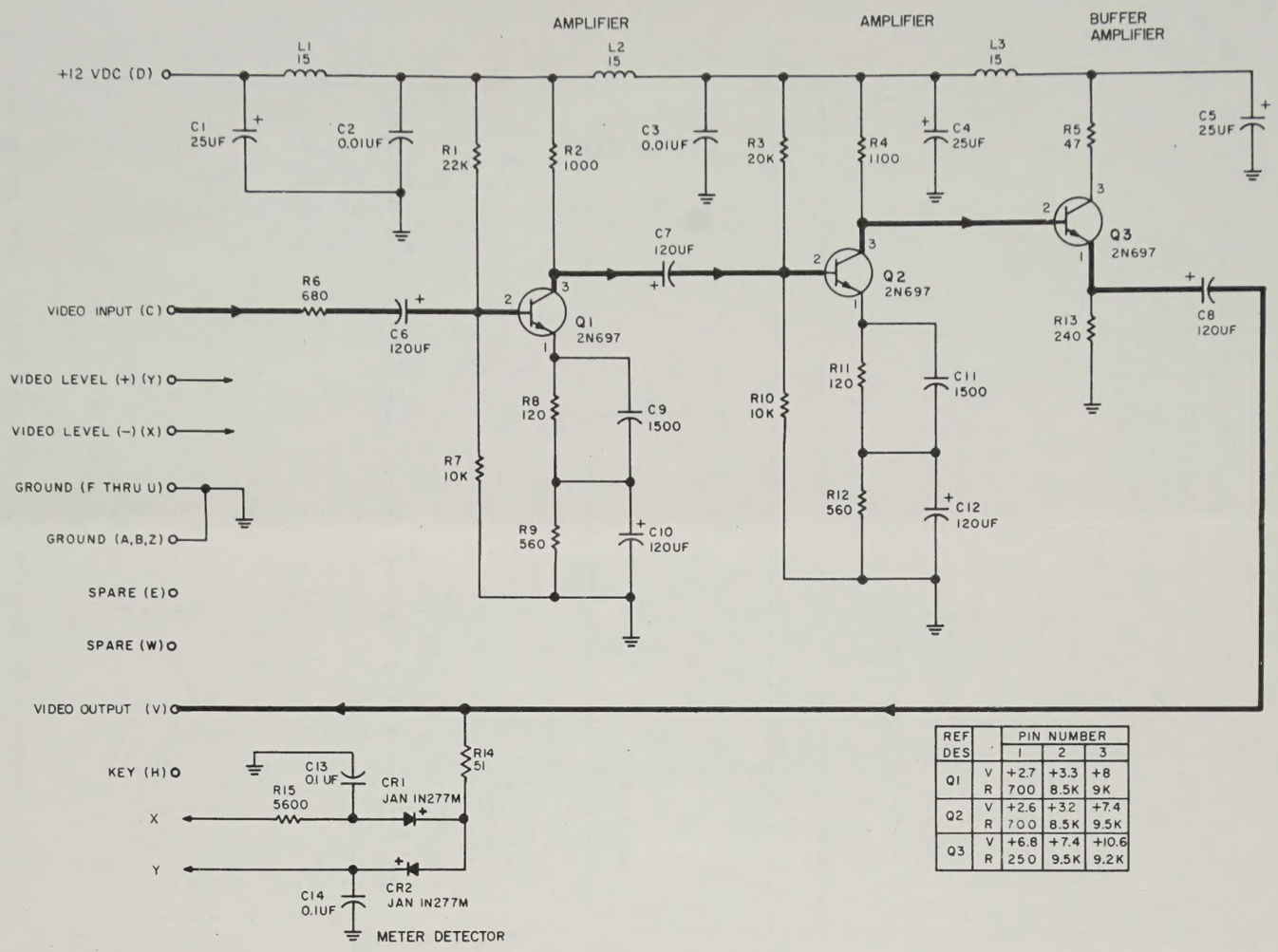
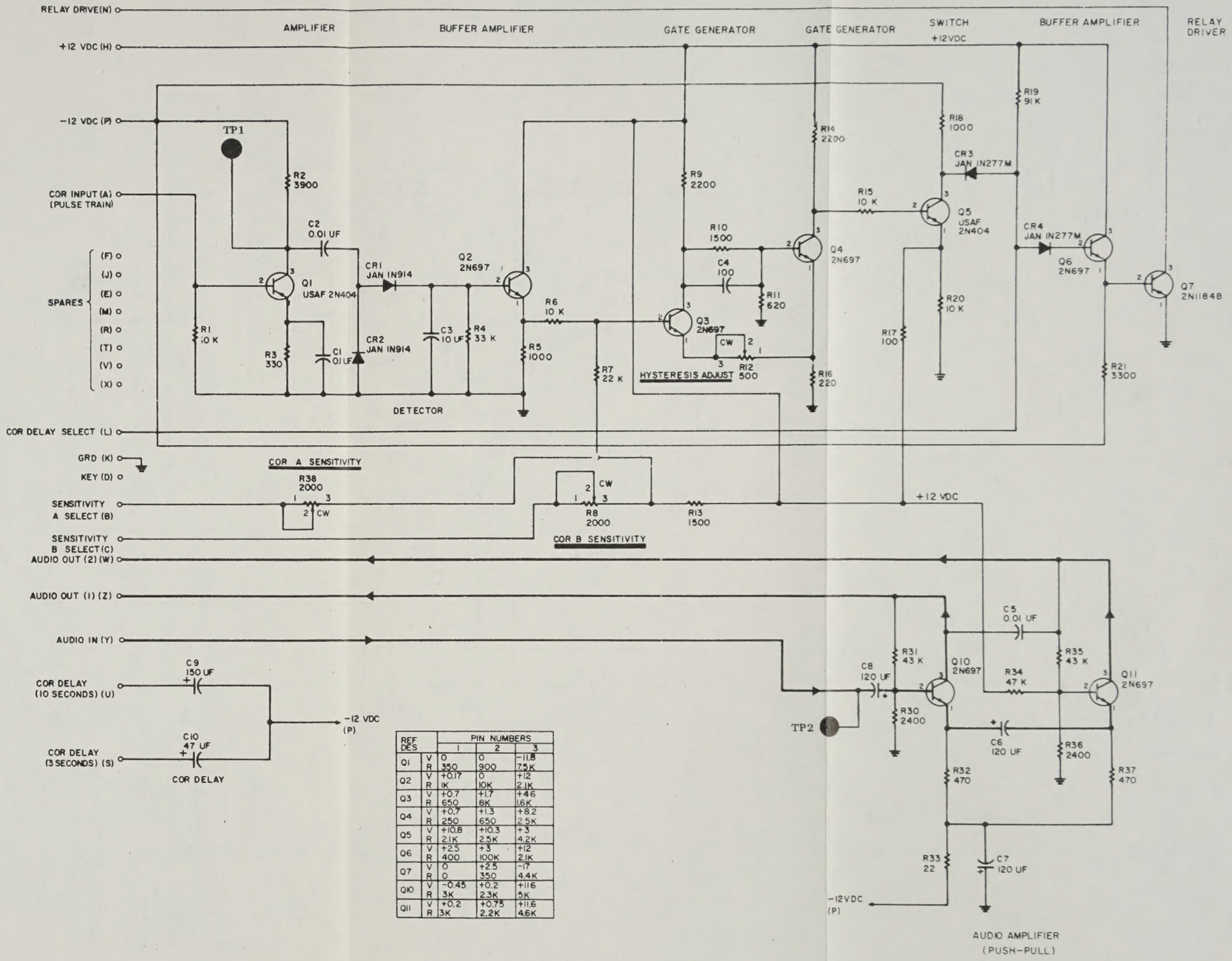


Figure 6-10. Beat Frequency Oscillator Unit A5, Schematic Diagram



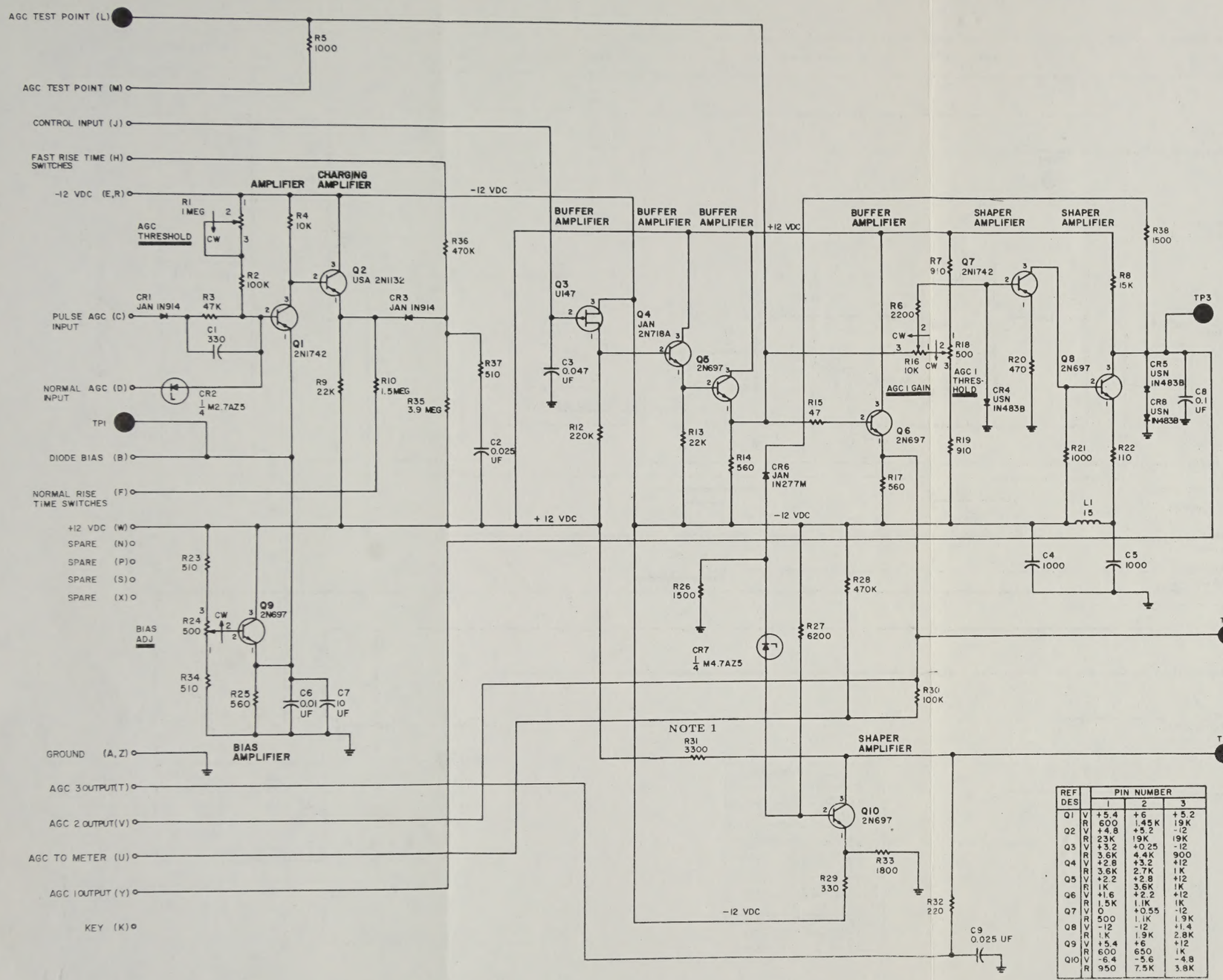
REF DES		PIN NUMBER 1	2	3
Q1	V	+2.7	+3.3	+8
	R	700	8.5K	9K
Q2	V	+2.6	+3.2	+7.4
	R	700	8.5K	9.5K
Q3	V	+6.8	+7.4	+10.6
	R	250	9.5K	9.2K

Figure 6-11. Video Amplifier Board AR2, Schematic Diagram



REF DES		PIN NUMBERS 1	2	3
Q1	V	0	0	-11.8
	R	350	900	7.5K
Q2	V	+0.17	0	+12
	R	1K	10K	2.1K
Q3	V	+0.7	+1.7	+4.6
	R	650	8K	1.6K
Q4	V	+0.7	+1.3	+8.2
	R	250	650	2.5K
Q5	V	+10.8	+10.3	+3
	R	2.1K	2.5K	4.2K
Q6	V	+2.5	+3	+12
	R	400	100K	2.1K
Q7	V	0	+2.5	-17
	R	0	350	4.4K
Q10	V	-0.45	+0.2	+11.6
	R	3K	2.3K	5K
Q11	V	+0.2	+0.75	+11.6
	R	3K	2.2K	4.6K

Figure 6-12. Cor/Audio Amplifier Board A4, Schematic Diagram

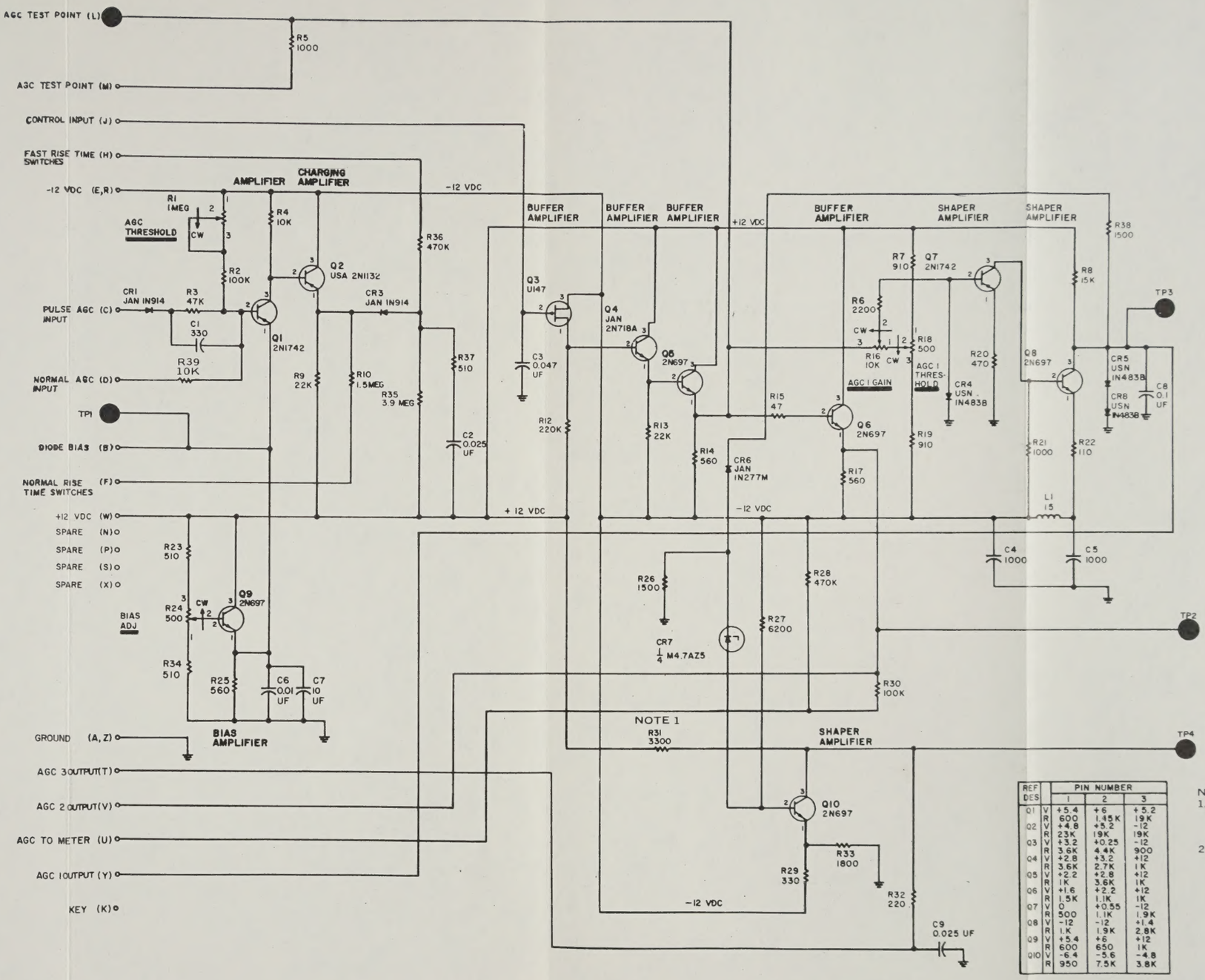


REF DES		PIN NUMBER 1	2	3
Q1	V	+5.4	+6	+5.2
	R	600	1.45K	19K
Q2	V	+4.8	+5.2	-12
	R	23K	19K	19K
Q3	V	+3.2	+0.25	-12
	R	3.6K	4.4K	900
Q4	V	+2.8	+3.2	+12
	R	3.6K	2.7K	1K
Q5	V	+2.2	+2.8	+12
	R	1K	3.6K	1K
Q6	V	+1.6	+2.2	+12
	R	1.5K	1.1K	1K
Q7	V	0	+0.55	-12
	R	500	1.1K	1.9K
Q8	V	-12	-12	+1.4
	R	1K	1.9K	2.8K
Q9	V	+5.4	+6	+12
	R	600	650	1K
Q10	V	-6.4	-5.6	-4.8
	R	950	7.5K	3.8K

NOTE:

1. R31 MAY BE 3300 OR 33,000 OHMS, 5% TOLERANCE, 1/4 WATT, DEPENDING ON THE CONFIGURATION BEING UTILIZED.

Figure 6-13. Automatic Gain Control Amplifier Board A8, Schematic Diagram



REF DES		PIN NUMBER 1	2	3
Q1	V	+5.4	+6	+5.2
	R	600	1.45K	19K
Q2	V	+4.8	+5.2	-12
	R	23K	19K	19K
Q3	V	+3.2	+0.25	-12
	R	3.6K	4.4K	900
Q4	V	+2.8	+3.2	+12
	R	3.6K	2.7K	1K
Q5	V	+2.2	+2.8	+12
	R	1K	3.6K	1K
Q6	V	+1.6	+2.2	+12
	R	1.5K	1.1K	1K
Q7	V	0	+0.55	-12
	R	500	1.1K	1.9K
Q8	V	-12	-12	+1.4
	R	1K	1.9K	2.8K
Q9	V	+5.4	+6	+12
	R	600	650	1K
Q10	V	-6.4	-5.6	-4.8
	R	950	7.5K	3.8K

NOTE:
1. R31 MAY BE 3300 OR 33,000 OHMS, 5% TOLERANCE, 1/4 WATT, DEPENDING ON THE CONFIGURATION BEING UTILIZED.
2. R39 10K REPLACES CR2 ON LATER UNITS.

Figure 6-13A. Automatic Gain Control Amplifier Board A8, Schematic Diagram.

LIST OF EFFECTIVE PAGES

Insert latest changed pages; dispose of superseded pages in accordance with applicable regulations.

NOTE: On a changed page, the portion of the text affected by the latest change is indicated by a vertical line, or other change symbol, in the outer margin of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Dates of issue for original and changed pages are:

Original...0...15 Nov 66 Change.....4....23 Feb 75
Change.....1....1 Jun 69
Change.....2...15 Feb 73
Change.....3...15 Jul 73

Total number of pages in this manual is 68 consisting of the following:

Page No.	#Change No.	Page No.	#Change No.	Page No.	#Change No.
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A	4				
i - ii	0				
1-1 - 1-7	0				
1-8 Blank	0				
2-1	0				
2-2 - 2-4	4				
3-1 - 3-4	0				
4-1 - 4-2	0				
4-3	3				
4-4 - 4-11	0				
4-12	4				
4-13 - 4-14	0				
4-15	4				
4-16 - 4-28	0				
4-29	4				
4-30	0				
4-31	4				
4-32 - 4-36	0				
4-37	4				
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4-48 Blank	0				

#Zero in this column indicates an original page.

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SECTION I
INTRODUCTION

1-1. SCOPE.

1-2. This Illustrated Parts Breakdown lists and illustrates all replaceable components, assemblies, and parts of Radio Receiver R-1283/GRC, part number 316465-1, manufactured by Airborne Instruments Laboratory, a division of Cutler-Hammer, Inc., Deer Park, Long Island, New York. This Illustrated Parts Breakdown is to be used together with the Service and Circuit Diagrams Manual whenever the Radio Receiver R-1283/GRC requires service or repair.

1-3. This Illustrated Parts Breakdown is divided into four sections as follows:

a. Section I, Introduction. This section contains the instructions you will need to use the information contained in Sections II, III, and IV of this chapter correctly.

b. Section II, Numerical Index. This section is a complete alphabetical-numerical index of all parts listed in Section IV and provides a cross reference to the figure and index numbers that illustrate and identify each part.

c. Section III, Reference Designation Index. This section is a complete listing of all electronic parts by their reference designations, arranged in alphabetical-numerical order. The Reference Designation Index provides a cross-reference to the part numbers and the figure and index numbers in Sections II and IV.

d. Section IV, Group Assembly Parts List. All replaceable parts and assemblies required for maintenance are illustrated, listed, and identified in this section.

1-4. NUMERICAL INDEX.

1-5. ARRANGEMENT. In the Numerical Index, manufacturer's part numbers are listed in alphabetical-numerical sequence in the MFR PART NUMBER column. The order of precedence in the first column of the part-number list is letters A through Z and then numerals 0 through 9 Alphabetical "0's" are considered to be numerical zeros The order of precedence established by succeeding columns of the list is as follows:

Space (blank column)
Diagonal (slant) /
Point (period) .
Dash (-)
Letters A through Z
Numerals 0 through 9

1-6. FIGURE AND INDEX NUMBERS. The FIG. AND INDEX NO. column in this section is a cross-reference to the figure and index number of the applicable part, as listed in the Group Assembly Parts List (Section IV). Parts that do not have index numbers assigned in Section IV are listed in the Numerical Index by only the figure number followed by a dash. The figure and index number for Government (AN and MS) standard hardware are listed only for their first appearance in the Group Assembly Parts List.

1-7. QUANTITY PER ARTICLE. The number shown in the QTY PER ART. column is the quantity of the applicable part required for the complete Radio Receiver.

1-8. SOURCE CODES. All source codes available at the time this manual was prepared are shown in the SOURCE CODE column. Any source code received before the next change (or revision) to this publication will be included in that change (or revision). Source codes are assigned as follows:

a. Code "P" identifies parts which may be requisitioned and installed by any level of maintenance consistent with the activity's authorized scope of maintenance. Code "P" is applied to parts on which usage is anticipated or known. Restricted (emergency) service manufacture of code "P" items is considered practical but may be accomplished only after confirmation of nonavailability from supply sources.

b. Code "PD" identifies parts which may be requisitioned and installed by AF activities authorized depot-level maintenance only. Code "PD" is applied to parts on which usage is anticipated or known. Restricted (emergency) service manufacture of code "PD" parts is considered practical but may be accomplished only after confirmation of nonavailability from supply sources.

c. Code "P1" identifies parts which may be requisitioned and installed by any maintenance level consistent with the activity's authorized scope of maintenance. Code "P1" is applied to parts on which usage is anticipated or known, and which service manufacture is considered impractical.

d. Code "P1D" identifies parts which may be requisitioned and installed by AF activities authorized depot-level maintenance only. Code "P1D" is applied to parts on which usage is anticipated or known, and which service manufacture is considered impractical.

e. Code "P2" identifies insurance-type spare parts which can be installed by any AF activity consistent with the activity's authorized scope of maintenance. This code is applied to such parts as are basically structural items of very limited usage, require special tools, templates, and/or jigs, and are very difficult, impractical, or uneconomical to manufacture by AF activities. These items are not subject to periodic replacement or wearout but may require infrequent replacement as a result of accidents or other unexpected occurrences. Delayed procurement items are included under this code.

f. Code "P2D" identifies insurance-type parts which may be installed by AF activities which are authorized depot-level maintenance only. This code is applied to parts as described under code "P2" and to delayed procurement items.

g. Code "M" identifies parts, the manufacture and installation of which are within the capabilities of field maintenance activities; and to which all of the following conditions apply:

(1) Procurement is not justified because of low usage or peculiar storage and installation factors. Needs are to be met by local manufacture only as required.
(2) Their manufacture does not require tools, equipment, or skills not normally authorized at field maintenance level.
(3) Does not require test equipment not normally authorized at field maintenance level.
(4) Does not require material not normally available in AF inventory.

h. Code "M1" identifies parts which can be manufactured at activities authorized depot-level maintenance facilities and to which all of the following conditions apply:

(1) Procurement is not justified because of low usage or peculiar storage and installation factors. The need of base activities are to be met by requisitioning from the geographical AMA, SSM AMA, or IM AMA.
(2) Their manufacture is beyond capabilities of field maintenance activities as outlined above.
(3) Their manufacture does not require tools or equipment not normally authorized at all AMA's.

i. Code "A" identifies items capable of being assembled at any level of maintenance and is applied to assemblies of two or more parts, the majority of which are purchased and/or service manufactured.

j. Code "A1" identifies assemblies which can be assembled at AF activities authorized depot-level maintenance only and is applied to assemblies described under "A" code.

k. Code "X" is applied to main structural members of similar parts, which, if required, would suggest extensive repair. The need for a part or parts coded "X" (wing spars, center section structure, etc.) should normally result in a recommendation to retire the article from service.

l. Code "X1" identifies parts applicable at any level of maintenance consistent with the activity's authorized scope of maintenance and for which it is more feasible to obtain the next higher assembly; for example, an integral detail part such as a welded segment inseparable from its assembly; a part machined in a matched set; or a part of any assembly which, if required, would suggest extensive reconditioning of such assembly. In some cases, code "X1" may be used to indicate an integral detail part of an assembly which has no anticipated usage and as an assembly was source-coded "M" or "M1."

m. Code "X1D" identifies parts which are described under the "X1" code but which are applicable to AF activities authorized depot-level maintenance only.

n. Code "X2" identifies parts which are applicable to any level of maintenance consistent with the activity's authorized scope of maintenance, for which there is no anticipated usage, and which are impractical for service manufacture. This type of item will not be stocked. Such parts shall be obtained from reclamation or, if not available from this source, requisitioned through normal supply channels together with supporting justification for one-time procurement and immediate use. Repeated requests shall justify a change to a code "P1" or "P2," as applicable, if considered economical to procure and store such parts.

o. Code "X2D" identifies parts which are described under the "X2" code but which are applicable to AF activities authorized depot-level maintenance only. Repeated requests for such parts shall justify a change to a "P1D" or "P2D" code, as applicable, if considered economical and feasible to procure and stock such parts.

p. Code "U"--Parts not Procured, Manufactured, or Stocked. Code "U" is applied to installation drawings, diagrams, instruction sheets, field-service drawing numbers, and parts not otherwise of supply significance, including obsolete parts, which cannot be procured or service manufactured.

1-9. REPAIRABILITY CODES. All repairability codes available at the time this manual was prepared are shown in the REPAIR CODE column. Any repairability code received before the next change (or revision) to this publication will be included in that change (or revision). Repairability codes are assigned as follows:

a. CODE "S"--NO REPAIR. Code "S" identifies items which are nonrepairable and have no reclamation value. When these items fail, they will be disposed of at user level as condemned material.

b. CODE "B"--NO REPAIR; RECONDITION. Code "B" identifies assemblies or parts that will be reconditioned at the user level by adjusting, cleaning, soldering broken connections, etc. If these items cannot be returned to serviceable condition by such means, they will be disposed of at user level as condemned material. No repair parts or tools are specially procured for maintenance of these items.

c. CODE "F"--REPAIR AT FIELD LEVEL. Code "F" identifies items which will be repaired by the field level maintenance activities. Normal servicing will be done by organizational level maintenance. Selected parts, tools, and technical order data are procured and provided to applicable field level maintenance activities for repair of these items. No SRA is established for these items. If the condition of these items is such that they cannot be returned to serviceable condition by the field level maintenance activity with authorized parts and tools, they will be disposed of as condemned material. If repair of "F" coded items cannot be accomplished due to unavailability of authorized parts, tools, or other capability, the applicable SSM/IM will be so advised with request for disposition instructions. "F" coded Hi-Valu or Critical Items, regardless of condition, will be turned into supply for disposition instructions from the applicable SSM/IM.

d. CODE "D"--LIMITED FIELD REPAIR; DEPOT OVERHAUL. Code "D" identifies items on which a limited degree of repair can be accomplished by field level maintenance activities. Normal servicing will be done at organizational level. SRA is established for overhaul of these items. A range of repair parts, tools, and technical order data consistent with the capability of repair are procured and provided to applicable field maintenance activities. Because of the design characteristics and complexity of repair, the degree of repair which is authorized on these items at the field maintenance level is necessarily determined by the degree of technical skills required and the cost of special tools, special test equipment, spare parts, and the predicted frequency of failure generation. If these items cannot be returned to serviceable condition with authorized parts and tools, they will be returned to supply for shipment to the designated SRA.

e. CODE "DM"--LIMITED FIELD REPAIR; MOBILE DEPOT OVERHAUL. Code "DM" identifies items to which all the conditions of code "D" apply except that repair beyond field capability will be done by the mobile depot activity (MDA). If the MDA cannot repair these items, they will determine whether these items should be condemned or sent to the SRA.

f. CODE "L"--DEPOT LEVEL MAINTENANCE ONLY. Code "L" identifies items that will be repaired only at designated SRA. Repair parts and tools for repair are procured and provided only to these authorized activities. Required functional checkout and bench check equipment may be provided to applicable organizational and field level maintenance activities for accomplishing external

adjustment or calibration and for verifying serviceability of these items. If they are found unserviceable, they will be turned in to supply for shipment to the SRA.

g. CODE "LM"--DEPOT LEVEL MAINTENANCE ONLY; MOBILE DEPOT ACTIVITY. Code "LM" identifies items to which all conditions of code "L" apply except that repair will be accomplished by MDA. If MDA cannot repair these items, they will determine whether these items should be condemned or sent to the SRA.

1-10. EQUIPMENT SPARES LEVEL. This column of the Numerical Index contains the approved spares quantity for the particular part listed.

1-11. REFERENCE DESIGNATION INDEX.

1-12. Reference designations are arranged in alphabetical-numerical sequence in the Reference Designation Index to permit rapid cross-reference to the figure and index numbers of the assembly or subassembly in which the part appears. Reference designations assigned to electrical and electronic parts consist of the following in accordance with MIL-STD-16:

a. A numerical prefix to identify the unit, and for subassemblies, a subassembly letter and number that is followed by the part class and number. For example, the first resistor to be assigned a reference designation on the Radio Frequency Band A Assembly (A1) in the Radio Receiver (unit 1) is 1A1R1.

b. The reference designations shown are the same as the reference designations shown in the Service and Circuit Diagrams Manual.

1-13. GROUP ASSEMBLY PARTS LIST.

1-14. The Group Assembly Parts List contains a breakdown of all replaceable parts of the Radio Receiver listed in the order of disassembly (where disassembly order is significant), beginning with the complete set, main groups, each major assembly, and detailed subassemblies and parts.

1-15. Each item of the Group Assembly Parts List is arranged and indented to show its proper relationship to the unit of which it is a part and to the complete article. Each assembly listed is followed immediately (except for attaching parts) by its component parts, properly indented to show their relationship to the assembly.

1-16. Attaching parts are listed immediately following the part they attach and have the same indentation. They are preceded by the words "ATTACHING PARTS" and are separated from the parts following by the symbol "---*---."

1-17. An example of the next higher assembly relationship, indicated by indentation, is as follows:

```
1 2 3 4 5 6 7 8 9

MAIN ASSEMBLY
. ASSEMBLY
  ATTACHING PARTS
. SCREW
. NUT
  ---*---
. . SUBASSEMBLY
. . . SUB-SUBASSEMBLY
```

1-18. Where disassembly is not significant, electronic components such as capacitors, coils, resistors, etc., are listed in groups according to type under each assembly in which they occur. Parts of riveted or welded assemblies or wiring components that are normally procured in bulk are not listed.

1-19. Each detailed part (except for hardware used as attaching parts) is keyed to the illustration in which it is shown by means of a figure and index number. Attaching parts are not indexed on the photographs but are listed in the Group Assembly Parts List immediately following the parts they attach.

1-20. The Group Assembly Parts List is divided into six columns as follows:

a. FIG. AND INDEX NO. This column contains the figure and index numbers of illustrated items.

b. MFR PART NUMBER. This column lists one of the following:

(1) An Airborne Instruments Laboratory part number for an item manufactured by Airborne Instruments Laboratory.
(2) The part number of a commercially manufactured item.
(3) A Government standard part number, such as AN or MS.

c. DESCRIPTION. This column identifies the item by one or more of the following means:

(1) Approved Federal Item Identification name obtained from Cataloging Handbook H6-1.
(2) Item name assigned by the manufacturer.

d. MFR CODE. This column lists the manufacturer's code number as listed in Cataloging Handbook H4-1. (Refer to paragraph 1-26.) When there is no entry in the MFR CODE column, the part is either an Airborne Instruments Laboratory part or a Government standard part.

e. UNITS PER ASSY. This column contains one of the following:

(1) The exact quantity of the item as required for its immediate next higher assembly. For example, if three dial-knob assemblies are used on an electronic unit, and each knob assembly breaks down into one knob and two setscrews, the "units per assembly" is shown as one knob and two screws, the quantity required for one knob assembly only.

(2) The symbol AR for "as required." These items are procured in bulk and used as required.

(3) The abbreviation REF for "reference." These items are listed for reference only and REF indicates that the quantity is listed in the next higher assembly in the Group Assembly Parts List, as indicated in the DESCRIPTION column.

f. USABLE ON CODE. This column contains coding that reflects component-part differences for similar units and assemblies. Uncoded parts are common to all assemblies or to the next higher assembly. When no entry is made in the USABLE ON CODE column, parts shown are usable as replacements on all articles covered by this publication.

USABLE ON CODE. "A" is used for serial number's 317 up.

1-21. EXPLANATION OF TERMS, ABBREVIATIONS, AND SYMBOLS.

1-22. Terms, abbreviations, and symbols used in this IPB are as follows:

a. The notation "See Fig. __ for NHA" following the description of a part indicates that the figure indicated contains the next higher assembly of that part.

b. The notation "See Fig. __" following the description of a part indicates that the item and its component parts are shown in detail in the figure indicated.

1-23. PART NUMBERS AND MANUFACTURER'S CODES.

1-24. Airborne Instruments Laboratory part numbers consist of a basic six-digit number suffixed by a dash number or numbers that can designate similar parts, or left- and right-hand parts, etc.

1-25. Purchased parts that are used on this equipment are listed under the manufacturer's number and can be procured through normal commercial sources.

1-26. The manufacturer's code number is listed in the MFR CODE column of Section IV by the Federal Supply Code for Manufacturers, obtained from Cataloging Handbook H4-1, except where a manufacturer's code cannot be found. In this case, a five-letter code has been assigned. Manufacturer's codes used in this publication are:

MANUFACTURER'S FEDERAL SUPPLY CODES

CODE	VENDOR'S NAME AND ADDRESS
05820	Wakefield Engineering Inc., Wakefield, Mass.
07387	The Birtcher Corp., Los Angeles, Calif.
09922	Burndy Corp., Norwalk, Conn.
13426	Chromalox Inc., Murfreesboro, Tenn.
14674	Corning Glass Works, Corning, N. Y.
15849	USECO Inc., Mt. Vernon, N. Y.
24455	General Electric Co., Lamp Division of Consumer Products Group, Nela Park, Cleveland, Ohio
28520	Heyman Mfg Co., Kenilworth, N. J.
30817	Instrument Specialties Co., Inc., Little Falls, N. J.
46384	Penn Engineering and Mfg Corp., Doylestown, Pa.
56289	Sprague Electric Co., North Adams, Mass.
56878	Standard Pressed Steel Co., Jenkintown, Pa.
59730	Thomas and Betts Co., Elizabeth, N. J.
70485	Atlantic India Rubber Works, Inc., Chicago, Ill.
71279	Cambridge Thermionic Corp., Cambridge, Mass.
71286	Camloc Fastener Corp., Paramus, N. J.
72962	Elastic Stop Nut Corp. of America, Union, N. J.
73957	Groov-Pin Corp., Ridgefield, N. J.
75376	Kurz-Kasch, Inc., Dayton, Ohio
76385	Minor Rubber Co., Inc., Bloomfield, N. J.
78189	Shakeproof Division of Illinois Tool Works, Elgin, Ill.
79963	Zierick Mfg Corp., New Rochelle, N. Y.
83330	Herman H. Smith, Inc., Brooklyn, N. Y.
86577	Precision Metal Products of Malden, Inc., Stoneham, Mass.
91506	Augat, Inc., Attleboro, Mass.
95354	Methode Manufacturing Co., Chicago, Ill.
98291	Sealectro Corp., Mamaroneck, N. Y.

NOTE

The prime contractor's code number (00752) Airborne Instruments Laboratory, a division of Cutler-Hammer, Inc., Deer Park, Long Island, New York will not appear in the Group Assembly Parts List.

1-27. IDENTIFICATION OF PARTS.

1-28. To find the part number of a part, proceed as follows:

a. Look in the Alphabetical Index for the figure number of the group assembly to which the part belongs.

b. Turn to the figure, find the illustration of the part, and note its index number.

c. Turn to the group assembly parts list that corresponds to the figure, find the index number of the part, and the desired part number will be found.

1-29. To find the illustration and description of a part, when the part number is known, proceed as follows:

a. Turn to the Numerical Index, find the part number of the part and note the corresponding figure and index number.

b. Turn to the figure, find the index number, and the desired illustrated part will be found.

c. Turn to the group assembly parts list that corresponds to the figure, find the index number, and the desired description will be found.

1-30. To find the illustration and description of a part, when the reference designation is known, proceed as follows:

a. Turn to the Reference Designation Index, find the reference designation of the part, and note the corresponding part number and figure and index number.

b. Turn to the figure, find the index number, and the desired illustrated part will be found.

c. Turn to the group assembly parts list that corresponds to the figure, find the index number, and the desired description will be found.

SECTION II
NUMERICAL INDEX

MFR PART NUMBER	FIG. AND INDEX NO.	QTY PER ART.	SOURCE CODE	REPAIR CODE	EQUIP. SPARES LEVEL
AN507C440-3	3-	9	P1	S	
AN507C440-7	3-	6	P1	S	
AN535-0-2	1-	4			
AN535-4-5	1-113	2			
AN565AC6H2	3-	4			
AN6230-10	3-11	2	P1	S	
	22-11				
CC20SH080C	4-23	1	P1	S	
CC20SH100C	4-24	1	P1	S	
CC20SKOR5C	14-4	3	P1	S	
	23-27				
CC20SK010C	23-26	3	P1	S	
CC20SK010D	17-4	1	P1	S	
CC50CH100D	19-3	1	P1	S	
CC52CH390J	19-2	1	P1	S	
CE10C250E	8-1	6	P1	S	
	10-8				
	15-4				
CK06CW222M	19-1	13	P1	S	
CK60AW102M	4-17	34	P1	S	
	5-4				
	8-3				
	10-7				
	17-12				
	19-5				
	23-14				
CK63AW103M	1-29	22	P1	S	
	1-102				
	5-3				
	8-2				
	10-6				
	13-1				
	15-3				
	17-11				
	21-6				
CLS440-1	3-30	16	P1	S	
	22-31				
CLS440-2	3-9	8	X1		
	3-17				
	22-9				
	22-17				
CLS632-2	1-111	16	P1	S	
CL65CG101MP3	1-76	1	P1	S	
CM05C050K03	8-8	12	P1	S	
	17-7				
CM05C080K03	4-29	4	P1	S	
	8-4				
	23-31				
CM05C100K03	23-30A	1			
CM05D101J03	4-25	4	P1	S	
	21-5				
	23-29				
CM05D200J03	4-30	3	P1	S	
	10-5				
	17-8				
CM05D220J03	19-1A	2			
CM05D221J03	4-32	1	P1	S	
CM05D240J03	4-27	2	P1	S	
	8-7				
CM05D300J03	8-6	2	P1	S	
CM05D330J03	4-31	3	P1	S	
CM05D331J03	5-2	3	P1	S	
	17-9				
	23-28				
CM05D390J03	8-5	4	P1	S	
	10-4				
	17-10				
CM05D470J03	10-3	3	P1	S	
	14-5				
CM05D510J03	4-28	2	P1	S	
	23-30				
CM05D680J03	4-26	3	P1	S	
	19-2A				
CM06D152J03	15-2	2	P1	S	
CP05A1KB104K	6-1	2	P1	S	
CS13AC121K	15-1	8	P1	S	
	21-4				
CS13AD151K	17-6	2	P1	S	
	21-3				
CS13AD220K	17-5	2	P1	S	
CS13AE100K	5-1	2	P1	S	
	21-2				
CS13AE101K	20-1	4	P1	S	
CS13AE470K	21-1	1	P1	S	
ES5103-2-0516	4-60	2	P1	S	
	4-61				
FHN26G	1-38	2	P1	S	
FTSM4TUR	4-65	7	P1	S	
	11-19				
	16-10				
	23-50				
F02B250V1/2AS	1-37	2	P1	S	
GSB071	1-71	23	P1	S	
	16-5				
	17-38				
HS08656-50	7-11	32	P1	S	
	7-13				
	9-14				
	9-16				
	16-17				
	16-19				
	18-14				
	18-16				
JAN1N277M	1-98	19	P1	S	
	5-39				
	8-19				
	10-20				
	15-19				
	17-29				
	21-30				
JAN1N3023B	6-14	2	P1	S	
JAN1N483B	5-38	3	P1	S	
JAN1N538	1-52	11	P1	S	
	6-13				
	20-14				
JAN1N914	5-37	7	P1	S	
	10-19				
	17-30				
	21-29				
JAN2N338	20-15	1	P1	S	
JJ033	1-27	1	P1	S	
LHA27M2860-40	4-67	24	P1	S	
	12-10				
	14-9				
	23-53				
LHTA3300-40	4-66	14	P1	S	
	23-54				
MR13S5T5DCUAR	1-14	1	P1	S	
MS15795-802	3-	69	P1	S	
MS15795-803	1-	44	P1	S	
MS15795-805	1-	4	P1	S	
MS16108-3A	1-43	1	P1	S	
MS16108-5A	1-44	5	P1	S	
MS16624-4025	1-9	4	P1	S	
MS16995-11	1-	4			
MS20426A2-3	4-	92			
MS20426AD3-4	1-	46	P1	S	
MS20426AD4-4	1-	2	P1	S	
MS20470AD2-3	4-	18	P1	S	
MS20470A2-3	4-	16	P1	S	
MS20470A3-2	8-	1			
MS21266-1N	3-27	AR	P1	S	
	22-28				
MS21266-2N	1-84	AR			
MS24013-1	1-58	2	P1	S	
MS24014-1	4-2	2	P1	S	
	23-2				
MS24017-2	7-	1	P1	S	
MS24018-6	1-68	5	P1	S	
	9-2				
	12-2				
	16-2				
	18-2				
MS24055-2	1-65	5	P1	S	
	1-67				
MS24056-2	7-1	5	P1	S	
	9-1				
	12-1				
	16-1				
	18-1				
MS24057-2	7-2	1	P1	S	
MS24120-2	1-68A	1			
MS24132R5	4-1	2	P1	S	
	23-1				
MS25257-3	1-6	1	P1	S	
MS35058-21	1-32	1	P1	S	
MS35058-22	1-48	1	P1	S	
MS35059-22	1-19	1	P1	S	
MS35059-23	1-26	1	P1	S	
MS35125-2	1-	2	P1	S	
MS35168-88E	31-1	1			
MS35173-274B	1-46	1	P1	S	
MS35179-1094A	1-40	2	P1	S	
	2-1				
MS35186-123A	1-41	1	P1	S	
MS35233-1	1-	13			
MS35233-12	4-	1			
MS35233-13	1-	5	P1	S	
MS35233-14	1-	61	P1	S	
MS35233-15	1-	25	P1	S	
MS35233-16	3-	2	P1	S	
MS35233-18	1-	13	P1	S	
MS35233-2	11-	4	P1	S	
MS35233-27	1-	18	P1	S	
MS35233-28	1-	1			
MS35233-29	1-	3	P1	S	
MS35233-3	1-	45	P1	S	
MS35233-4	3-	8			
MS35233-42	1-	8	P1	S	
MS35233-5	7-	38	P1	S	
MS35249-10	4-	2	P1	S	
MS35249-11	4-	9	P1	S	
MS35249-8	1-	24	P1	S	
MS35333-76	1-	2	P1	S	
MS35338-77	1-	75	P1	S	
MS35338-78	1-	25	P1	S	
MS35338-79	1-	19	P1	S	
MS35338-80	1-	8	P1	S	
MS35367-913A	26-1	1			
MS35489-1	22-20	1			
MS35489-4	1-107	6	P1	S	
	3-28				
	22-29				
MS35489-6	1-79	1	P1	S	
MS35489-9	1-106	4	P1	S	
MS35649-24	8-	10	P1	S	
MS35649-44	1-	3	P1	S	
MS35649-64	1-	3	P1	S	
MS75008-25	4-15	1	P1	S	
MS75008-28	19-6	8	P1	S	
	23-34				
MS75008-33	23-33A	1			
MS75008-34	23-16	6	P1	S	
MS75008-42	4-16	25	P1	S	
	5-8				
	9-4A				
	10-9				
	15-6				
	17-13				
	23-15				
MS91189-37	6-2	2	P1	S	
MS91528-1E1B	1-20	1	P1	S	
MS91528-1E2B	1-15	5	P1	S	
MX1684/U	26-2	2			
	31-2				
NF213	20-19	2	P1	S	
PC40J4R5	4-12	9	P1	S	
	23-19				
PC40J8R5	4-11	9	P1	S	
	14-2				
PC41H180	10-2	1	P1	S	
RC07GF100J	23-42	1	P1	S	
RC07GF101J	21-27	2	P1	S	
	23-17				
RC07GF102J	1-21	16	P1	S	
	4-48				
	5-34				
	6-11				
	10-18				
	15-18				
	17-28				
	19-23				
	20-9				
	21-26				
	23-37A				

MFR PART NUMBER	FIG AND INDEX NO	QTY PER ART	SOURCE CODE	REPAIR CODE	EQUIP. SPARES LEVEL
RC07GF103J	4-50	32	P1	S	
	5-33				
	5-36A				
	6-10				
	10-17				
	13-9				
	15-17				
	17-27				
	19-22				
	21-25				
	23-41				
RC07GF104J	5-32	6	P1	S	
	8-18				
	17-26				
RC07GF105J	1-54	1	P1	S	
RC07GF110J	13-8	2	P1	S	
	23-41B				
RC07GF111J	5-31	1	P1	S	
RC07GF112J	15-16	1	P1	S	
RC07GF114J	20-4	1	P1	S	
RC07GF121J	15-15	2	P1	S	
RC07GF123J	20-3	2	P1	S	
RC07GF132J	19-21	1	P1	S	
RC07GF152J	4-45	11	P1	S	
	5-30				
	17-25				
	20-8				
	21-23				
	23-18				
RC07GF153J	4-43	2	P1	S	
	5-26				
RC07GF155J	5-29	1	P1	S	
RC07GF180J	11-13	2	P1	S	
RC07GF182J	5-27	2	P1	S	
	19-13				
RC07GF201J	4-44	4	P1	S	
	13-7				
	19-16				
RC07GF203J	15-8	1			
RC07GF220J	2-5	6	P1	S	
	3-7				
	21-22				
	22-7				
RC07GF221J	5-15	8	P1	S	
	10-16				
	13-6				
	17-24				
	21-21				
RC07GF222J	5-25	9	P1	S	
	6-9				
	8-17				
	21-20				
	23-40				
RC07GF223J	1-23	8	P1	S	
	5-24				
	8-16				
	15-14				
	21-19				
	23-39				
RC07GF224J	5-23	2	P1	S	
	10-15				
RC07GF242J	21-18	3	P1	S	
	19-15A				
RC07GF272J	4-42	1	P1	S	
RC07GF302J	4-41	8	P1	S	
	10-14				
	13-5				
	17-23				
	19-18				
RC07GF330J	10-13	1	P1	S	
RC07GF331J	20-7	3			
	21-17				
RC07GF332J	4-46	10	P1	S	
	8-15				
	17-22				
	19-17				
	21-16				
RC07GF333J	5-22	5	P1	S	
	17-21				
	21-15				
	23-41A				
RC07GF362J	10-12	1	P1	S	
RC07GF391J	6-8	2	P1	S	
RC07GF392J	21-14	1	P1	S	
RC07GF395J	5-28	1	P1	S	
RC07GF433J	21-13	2	P1	S	
RC07GF470J	4-49	8	P1	S	
	5-21				
	6-7				
	14-3A				
	15-13				
	17-20				
RC07GF471J	5-20	4	P1	S	
	19-19				
	21-12				

MFR PART NUMBER	FIG AND INDEX NO	QTY PER ART	SOURCE CODE	REPAIR CODE	EQUIP. SPARES LEVEL
RC07GF472J	4-51	9	P1	S	
	6-6				
	20-10				
	23-37				
RC07GF473J	4-52	3	P1	S	
	5-19				
	21-11				
RC07GF474J	5-18	3	P1	S	
	17-19				
RC07GF510J	11-15	4	P1	S	
	13-4				
	15-12				
	23-36				
RC07GF511J	5-17	5	P1	S	
	8-14				
	17-18				
RC07GF512J	6-4	9	P1	S	
	8-13				
	19-15				
RC07GF561J	15-11	2	P1	S	
RC07GF562J	15-10	1	P1	S	
RC07GF620J	11-14	1	P1	S	
RC07GF621J	4-47	6	P1	S	
	20-6				
	21-28				
RC07GF622J	5-16	1	P1	S	
RC07GF624J	1-95A	1			
RC07GF680J	4-39	2	P1	S	
	17-17				
RC07GF681J	10-11	2	P1	S	
	15-9				
RC07GF682J	4-40	5	P1	S	
	8-12				
	19-14				
	20-5				
RC07GF820J	19-20	1	P1	S	
RC07GF821J	19-12	4	P1	S	
RC07GF822J	23-38	1			
RC07GF911J	5-14	2	P1	S	
RC07GF913J	21-24	1			
RC20GF112J	4-38	1	P1	S	
RC20GF331J	5-13	3	P1	S	
	20-2				
RC20GF391J	19-11	1	P1	S	
RC20GF561J	5-12	3	P1	S	
RC32GF241J	15-7	1	P1	S	
RC42GF153J	6-3	2	P1	S	
RG188A/U	24-5	AR			
	25-5				
	27-5				
	28-5				
	29-7				
	30-5				
RG58C/U	26-5	AR			
	31-5				
RJ11BP105	5-11	1	P1	S	
RT11C2P103	5-10	1	P1	S	
RT11C2P201	20-11	2	P1	S	
RT11C2P202	21-10	1	P1	S	
RT11C2P501	5-9	2	P1	S	
RT11C2P502	6-5	2	P1	S	
RT22C2L500	11-4	1	P1	S	
RT22C2P202	21-9	1			
RT22C2P501	21-8				
RV6NAYSD502A	1-22	1	P1	S	
SB250	16-10A	2			
SCH742-3BB40806	1-8	2	P1	S	
SD622SP2	1-95	1	P1	S	
SD622SP4	1-96	1	P1	S	
SD622SP6	1-63	1	P1	S	
SD622SP7	1-86	1	P1	S	
SD622SP9	1-62	1	P1	S	
SLPSA	4-7	2	P1	S	
	23-7				
SR5P1	1-34	1	P1	S	
STSM1TUR	2-6	11	P1	S	
	4-64				
	23-48				
	23-49				
STSM16TUR	3-8	7	X1		
	4-63				
	22-8				
TGP10	5-7	6	P1	S	
	15-5				
	17-3				
	21-7				
TGS25	5-6	2	P1	S	
TGS50	1-103	14	P1	S	
	10-1				
	13-2				
	17-2				
TY06-121J	19-4	5	P1	S	
UL256-1	2-2	35	P1	S	
	2-7				
	11-2				
	11-6				

MFR PART NUMBER	FIG AND INDEX NO	QTY PER ART	SOURCE CODE	REPAIR CODE	EQUIP. SPARES LEVEL
	11-20				
	14-8				
USAF2N404	6-17	7	P1	S	
	17-34				
	20-16				
	21-32				
USA2N1485	20-17	1	P1	S	
USN1N754A	20-13	2	P1	S	
USN1N986B	20-12	1	P1	S	
USN2N1132	5-45	1	P1	S	
USN2N718A	5-42	1	P1	S	
YIC071	29-3	2			
YOE90	1-70	25	P1	S	
	16-4				
	17-37				
	29-2				
ZX4116	4-8	AR			
	23-8				
1KD3-9D	3-5	4			
	22-5				
108069-22	23-25	1	P1	S	
108069-26	23-24	2	P1	S	
110	23-12	2	P1	S	
1178-3	6-19	5			
	20-21				
1454	4-20	3	P1	S	
	23-21				
146131-235	1-13	1	P1	S	
148325-34	4-14	28	P1	S	
	9-4				
	16-6				
	18-4				
	23-11				
1481B	1-31	39			
	1-53				
	1-77				
	1-104				
	4-59				
	9-5A				
	23-46				
1558-2-05	5-40	8	P1	S	
	6-12				
	21-31				
2N2398	4-57	6	P1	S	
	4-57A				
	23-45				
	23-45A				
223023-1	11-1	AR			
224804-1	1-90	1	P1	DM	
225313-1	8-9	1	P1	S	
225525-2	1-7	1	U		
225789-10	8-11	2	P1	S	
	17-16				
225789-4	19-7	2	P1	S	
225789-5	8-10	5	P1	S	
	17-14				
225789-7	17-15	3	P1	S	
	19-8				
225789-9	19-9	1			
226406-1	1-25	1	P1	S	
226492-1	1-49	1	P1	S	
(SEE 94CSA1-2-202)					
	19-24				
226942-1	17-31	1	P1	S	
226957-1	11-16	1	P1	S	
226971-2	3-1	2	P1	S	
	22-1				
226978-1	4-9	1	P1	DM	
226978-2	23-9	1	P1	S	
226986-1	4-13	1	P1	S	
226986-2	23-20	1	P1	S	
226987-1	4-22	4	P1	S	
	23-23				
226988-1	(SEE 2N2398)			S	
226988-2	(SEE 2N2398)				
226988-3	(SEE 2N2398)				
227004-1	4-19	1	P1	S	
227005-1	1-16	1	P1	S	
227082-1	6-16	3	P1	S	
	17-33				
227125-1	17-1	1	P1	S	
227155-1	1-17	1	P1	S	
227206-1	4-21	3	P1	S	
	23-22				
227234-1	1-99	1	P1	S	
227235-1	4-34	1	P1	S	
227235-2	4-35	4	P1	S	
227235-3	4-33	1	P1	S	
227235-4	19-10	1	P1	S	
227235-5	4-37	1	P1	S	
227235-6	23-35	1	P1	S	
227520-1	18-9	1	P1	S	
227523-1	18-15	1	M1		
228368-1	19-26	1	P1	S	
2916-04-01	1-30	10	P1	S	
	1-78				
	1-105				

MFR PART NUMBER	FIG. AND INDEX NO.	QTY PER ART.	SOURCE CODE	REPAIR CODE	EQUIP. SPARES LEVEL
3AL635-2R	15-21	3	P1	S	
	21-34				
310023-1	1-92	1	P1	S	
310024-1	1-91	1	P1	S	
311193-1	5-43	2	P1	S	
312491-9	26-2A	AR			
316039-1	1-110	1	M1		
316116-1	12-	1	M1		
316116-6	12-11	1	M1		
316123-1	1-81	1	P1	DM	
316124-1	1-42	1	P1	DM	
316127-1	12-4	1	M1		
316131-1	12-9	4	P1	S	
316131-2	1-100	1	P1	S	
316166-1	1-80	1	P1	DM	
316168-1	1-83	1	P1	DM	
316177-1	3-	1	P1	S	
316177-6	3-13	1			
316185-1	11-	1	M1		
316185-6	11-3	1	M1		
316190-1	22-	1	P1	S	
316190-6	22-13	1			
316198-1	11-	1	M1		
316198-6	11-1A	1	M1		
316217-1	7-6	1	P1	S	
316219-1	8-21	1	P1	S	
316222-1	2-	1	X2		
316222-6	2-8	1	X2		
316223-1	2-	1	X2		
316223-6	2-3	1	X2		
316241-1	18-7	1	M1		
316242-1	18-8	1	M1		
316244-1	11-18	1	M1		
316246-1	1-64	1	P1	S	
316249-1	15-22	1	P1	S	
316250-1	13-12	1	P1	S	
316254-1	11-5	1	M1		
316255-1	10-24	1	P1	S	
316256-1	6-20	1	P1	S	
316257-1	3-19	1	P1	DM	
316258-1	22-19	1	P1	DM	
316259-1	5-47	1	P1	S	
316262-1	17-39	1	P1	S	
316309-1	14-	1	M1		
316309-6	14-10	1	M1		
316313-1	21-36	1	P1	S	
316330-1	20-22	1	P1	S	
316331-1	14-1	1	M1		
316365-1	1-59	1	P1	DM	
316389-1	9-8	1	M1		
316390-1	9-7	1	M1		
316391-1	16-9	1	M1		
316392-1	16-11	1	M1		
316393-1	7-4	1	X2		
316394-1	7-5	1	X2		
316399-1	3-3	4	P1	S	
	22-3				
316406-1	3-	2	P1	S	
	22-				
316406-6	3-10	2	X1		
	22-10				
316414-1	3-	1	X2		
316414-2	22-	1	M1		
316414-6	3-18	2	X2		
	22-18				
316415-1	3-29	1	M1		
316415-2	22-30	1	M1		
316425-1	1-50	2	X2		
316425-2	1-26	2	X2		
316426-1	9-9	1	P1	S	
316427-1	3-	2	P1	S	
	22-				
316427-6	3-6	2			
	22-6				
316438-1	1-85	1	P1	F	
316439-1	1-94	1	P1	F	
316451-1	3-20	1	M		
316451-2	22-21	1	M		
316452-1	3-21	2	M		
	22-22				
316453-1	3-22	2	M		
	22-23				
316454-1	3-23	2	M		
	22-24				
316455-1	3-24	2	M		
	22-25				
316456-1	3-25	2	M		
	22-26				
316456-2	3-26	2	M		
	22-27				
316465-1	1-	1	A		

MFR PART NUMBER	FIG. AND INDEX NO.	QTY PER ART.	SOURCE CODE	REPAIR CODE	EQUIP. SPARES LEVEL
316467-1	12-8	1	P1	S	
316468-1	3-	1	M1		
316468-2	22-	1	M1		
316484-1	16-12	1	P1	S	
316504-1 (Deleted)	5-36	1	P1	S	
316504-3	5-35	1	P1	S	
316505-1	1-39	1	P1	S	
316506-1	1-57	3	P1	S	
316507-1	1-56	2	P1	S	
316507-2	1-55	1	P1	S	
316508-1	1-18	1	P1	S	
316510-1	5-5	1	P1	S	
316510-2	1-51	1	P1	S	
316514-1	1-88	1	P1	DM	
316515-1	16-18	1	M1		
316520-1	1-101	1	P1	DM	
316526-1	1-61	1	P1	F	
316533-1	1-10	2	P1	S	
316534-1	1-60	1	P1	F	
316537-1	7-12	1	M1		
316538-1	1-72	1	P1	DM	
316543-1	1-93	1	P1	F	
316546-1	9-15	1	M1		
316547-1	1-75	1	P1	DM	
316559-1	3-15	1	X2		
316560-1	22-15	1	M1		
316583-1	24-1	2	X1		
	25-1				
316585-1	22-14	1	M		
316586-1	3-14	1	M		
316587-1	3-	1	X2		
316588-1	22-	1	M1		
316590-1	16-16	1	M1		
316590-2	7-10	1	M1		
316590-5	9-13	1	M1		
316590-6	18-13	1			
316617-1	12-5	2	P1	S	
316630-1	1-3	1	X2		
316631-1	13-3	1	P1	S	
316633-1	1-	1	M1		
316633-6	1-	1	M1		
316640-1	1-1	1	X2		
316671-1	8-20	1	P1	S	
316672-1	6-15	2	P1	S	
316673-1	20-18	2	P1	S	
	21-33				
316675-1	4-53	2	P1	S	
	23-43				
316684-1	1-11	1	P1	S	
316684-2	1-12	1	P1	S	
316810-1	5-41	1	P1	S	
316815-1	5-46	27	P1	S	
	6-18				
	10-23				
	13-11				
	15-20				
	17-36				
	19-25				
	20-20				
	21-35				
317154-1	4-3	1	X2		
317154-10	12-3	1	M		
317154-11	27-	1			
317154-12	30-3	1			
317154-13	30-	1			
317154-14	27-	1			
317154-15	30-	1			
317154-16	30-	1			
317154-17	18-3	1	M		
317154-18	9-3	1	M		
317154-2	26-3	1			
317154-20	1-69	1	M		
317154-21	28-3	1			
317154-22	28-	1			
317154-23	28-	1			
317154-24	28-	1			
317154-25	28-2	1			
317154-26	28-	1			
307154-27	28-	1			
317154-28	28-	1			
317154-29	28-4	1			
317154-3	27-3	1			
317154-30	28-	1			
317154-31	28-	1			
317154-32	28-	1			
317154-33	24-4	1			
317154-34	25-4	1			
317154-35	29-4	1			
317154-36	29-	1			
317154-38	24-3	1			
317154-39	25-3	1			

MFR PART NUMBER	FIG. AND INDEX NO.	QTY PER ART.	SOURCE CODE	REPAIR CODE	EQUIP. SPARES LEVEL
317154-4	27-	1			
317154-40	26-4	1			
317154-41	27-4	1			
317154-42	27-	1			
317154-43	31-4	1			
317154-44	27-	1			
317154-45	27-	1			
317154-46	27-	1			
317154-47	30-4	1			
317154-48	30-	1			
317154-49	27-	1			
317154-5	23-3	1	M		
317154-50	30-	1			
317154-51	30-	1			
317154-52	29-5	1			
317154-53	29-	1			
317154-6	31-3	1			
317154-7	27-	1			
317154-8	27-	1			
317154-9	16-3	1	M		
317166-1	1-89	1	P1	S	
317166-2	1-66	1	P1	S	
317166-3	1-82	1	P1	S	
317166-4	1-87	1	P1	S	
317166-5	1-36	1	P1	S	
317166-6	1-45	1	P1	S	
317175-1	1-73	1	P1	S	
317175-2	1-74	1	P1	S	
317179-1	4-4	1			
317179-10	11-10	1	P1	S	
317179-11	11-11	1	P1	S	
317179-12	11-12	1	P1	S	
317179-2	4-5	1	P1	S	
317179-3	4-6	1	P1	S	
317179-4	23-4	1	P1	S	
317179-5	23-5	1	P1	S	
317179-6	23-6	1	P1	S	
317179-7	11-7	1	P1	S	
317179-8	11-8	1	P1	S	
317179-9	11-9	1	P1	S	
317201-1	14-6	2	P1	S	
317203-1	10-21	3	P1	S	
	13-10				
317204-1	10-10	1	P1	S	
317206-1	10-22	1	P1	S	
317275-1	23-44	1	P1	S	
317279-1	4-36	1	P1	S	
317280-1	4-55	1	P1	S	
317281-1	4-56	1	P1	S	
317282-1	4-54	1	P1	S	
317309-1	3-12	2			
	22-12				
317316-1	23-31A	3	P1	S	
317316-2	23-32	3	P1	S	
317316-3	23-33	1	P1	S	
317321-1	3-	1	P1	S	
317321-6	3-2	1	P1	S	
317322-1	22-	1	P1	S	
317322-6	22-2	1	P1	S	
317533-1	1-4	1			
331804-1	23-	1	M1		
331804-6	23-48A	1	M1		
331831-1	4-	1	X2		
331831-6	4-72	1	X2		
331831-7	4-69	1	X2		
331831-8	4-70	1	X2		
331831-9	4-71	1	X2		
331836-1	23-	1	M1		
331836-6	23-58	1	M1		
331836-7	23-55	1	M1		
331836-8	23-56	1	M1		
331836-9	23-57	1	M1		
331837-1	22-16	1	M1		
331873-1	4-62	1	X2		
331874-1	3-16	1	X2		
333	4-10	21	P1	S	
	4-18				
	9-6				
	12-7				
	16-8				
	18-6				
	23-10				
	23-13				
426	4-58	6	P1	S	
	11-17				
	14-7				
	23-47				
5R2-3	1-112	23	P1	S	
5S3-2	1-2A	23			
	1-5A				

MFR PART NUMBER	FIG. AND INDEX NO	QTY PER ART	SOURCE CODE	REPAIR CODE	EQUIP. SPARES LEVEL
5S35-5	1-2 1-5	22			
5S35-6	1-4A	1			
50-007-0000	24-2 27-1	7			
50-011-0000	25-2 28-1 29-1 30-1	15			
50-043-4401	2-4 7-3 9-5 12-6 14-3 16-7 18-5	18	P1	S	
50FM256	11- 14-	4	P1	S	
50FM440	9- 12- 16- 18-	5	P1	S	
55-013-4401	27-2 30-2	10			
58FH256	4- 23-	11			
58FH440	1- 4- 23-	38	P1	S	
58FH632	1-	6	P1	S	
6016-14C	1-109	1	P1	S	
6024-4A	4-68 23-51 23-52	5	P1	S	
6186-1C	8-22	1			
683	3-4 22-4	2	P1	S	
7136035	**5-44 17-32 19-24**	**10**	**P1**	**S**	
94CSA1-2-202	**1-49**	**1**	**P1**	**S**	
97-251A5-3/8	16-14 18-11	2	P1	S	
97-251A6-1/2	7-8 9-11	2	P1	S	
97-380A5-3/8	16-15 18-12	2	P1	S	
97-380A6-1/2	7-9 9-12	2	P1	S	
97-390A5-3/8	16-13 18-10	4	P1	S	
97-390A6-1/2	7-7 9-10	4	P1	S	
990050-1	1-35	1	P1	S	
990076-1	1-33	1	P1	S	
990161-114	1-24	1	P1	S	
990163-112	1-17	1	P1	S	
990166-0	29-6	1	P1	S	

MFR PART NUMBER	FIG. AND INDEX NO	QTY PER ART	SOURCE CODE	REPAIR CODE	EQUIP. SPARES LEVEL

MFR PART NUMBER	FIG. AND INDEX NO	QTY PER ART	SOURCE CODE	REPAIR CODE	EQUIP. SPARES LEVEL

SECTION III

REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG. AND INDEX NO.	MFR PART NUMBER
1	1-	316465-1
1AR1	1-90	224804-1
1AR1C1	19-4	TY06-121J
1AR1C10	19-1A	CM05D220J03
1AR1C11	19-4	TY06-121J
1AR1C12	19-1	CK06CW222M
1AR1C13	19-1	CK06CW222M
1AR1C14	19-1	CK06CW222M
1AR1C15	19-2A	CM05D680J03
1AR1C16	19-1	CK06CW222M
1AR1C17	19-4	TY06-121J
1AR1C18	19-1	CK06CW222M
1AR1C19	19-1	CK06CW222M
1AR1C2	19-5	CK60AW102M
1AR1C20	19-1	CK06CW222M
1AR1C21	19-3	CC50CH100D
1AR1C22	18-4	148325-34
1AR1C23	18-4	148325-34
1AR1C24	19-1	CK06CW222M
1AR1C25	19-5	CK60AW102M
1AR1C26	19-1	CK06CW222M
1AR1C27	19-1	CK06CW222M
1AR1C3	19-1	CK06CW222M
1AR1C4	19-1A	CM05D220J03
1AR1C5	19-4	TY06-121J
1AR1C6	19-1	CK06CW222M
1AR1C7	19-2	CC52CH390J
1AR1C8	19-4	TY06-121J
1AR1C9	19-1	CK06CW222M
1AR1J1	18-5	50-043-4401
1AR1J2	18-5	50-043-4401
1AR1L1	19-10	227235-4
1AR1L10	19-9	225789-9
1AR1L11	19-6	MS75008-28
1AR1L2	19-8	225789-7
1AR1L3	19-7	225789-4
1AR1L4	19-8	225789-7
1AR1L5	19-6	MS75008-28
1AR1L6	19-7	225789-4
1AR1L7	19-6	MS75008-28
1AR1L8	19-6	MS75008-28
1AR1L9	19-6	MS75008-28
1AR1P1	18-1	MS24056-2
1AR1Q1	19-24	226941-1
1AR1Q2	19-24	226941-1
1AR1Q3	19-24	226941-1
1AR1Q4	19-24	226941-1
1AR1Q5	19-24	226941-1
1AR1Q6	19-25	316815-1
1AR1R1	19-20	RC07GF820J
1AR1R10	19-15	RC07GF512J
1AR1R11	19-17	RC07GF332J
1AR1R12	19-12	RC07GF821J
1AR1R13	19-13	RC07GF182J
1AR1R14	19-22	RC07GF103J
1AR1R15	19-18	RC07GF302J
1AR1R16	19-12	RC07GF821J
1AR1R17	19-21	RC07GF132J
1AR1R18	19-11	RC20GF391J
1AR1R19	19-14	RC07GF682J
1AR1R2	19-15	RC07GF512J
1AR1R20	19-14	RC07GF682J
1AR1R21	19-17	RC07GF332J
1AR1R22	19-15A	RC07GF242J
1AR1R23	19-18	RC07GF302J
1AR1R24	19-22	RC07GF103J
1AR1R25	19-16	RC07GF201J
1AR1R26	19-16	RC07GF201J
1AR1R3	19-17	RC07GF332J
1AR1R4	19-12	RC07GF821J
1AR1R5	19-19	RC07GF471J
1AR1R6	19-15	RC07GF512J
1AR1R7	19-17	RC07GF332J
1AR1R8	19-12	RC07GF821J
1AR1R9	19-23	RC07GF102J
1AR2	1-85	316438-1
1AR2CR1	15-19	JAN1N277M
1AR2CR2	15-19	JAN1N277M
1AR2C1	15-4	CE10C250E
1AR2C10	15-1	CS13AC121K
1AR2C11	15-2	CM06D152J03
1AR2C12	15-1	CS13AC121K
1AR2C13	15-5	TGP10
1AR2C14	15-5	TGP10
1AR2C2	15-3	CK63AW103M
1AR2C3	15-3	CK63AW103M
1AR2C4	15-4	CE10C250E
1AR2C5	15-4	CE10C250E
1AR2C6	15-1	CS13AC121K
1AR2C7	15-1	CS13AC121K
1AR2C8	15-1	CS13AC121K
1AR2C9	15-2	CM06D152J03
1AR2L1	15-6	MS75008-42
1AR2L2	15-6	MS75008-42
1AR2L3	15-6	MS75008-42
1AR2Q1	15-20	316815-1
1AR2Q2	15-20	316815-1
1AR2Q3	15-20	316815-1
1AR2R1	15-14	RC07GF223J
1AR2R10	15-17	RC07GF103J
1AR2R11	15-15	RC07GF121J
1AR2R12	15-11	RC07GF561J
1AR2R13	15-7	RC32GF241J
1AR2R14	15-12	RC07GF510J
1AR2R15	15-10	RC07GF562J
1AR2R2	15-18	RC07GF102J
1AR2R3	15-8	RC07GF203J
1AR2R4	15-16	RC07GF112J
1AR2R5	15-13	RC07GF470J
1AR2R6	15-9	RC07GF681J
1AR2R7	15-17	RC07GF103J
1AR2R8	15-15	RC07GF121J
1AR2R9	15-11	RC07GF561J
1AR3	1-75	316547-1
1AR3CR1	10-20	JAN1N277M
1AR3CR2	10-20	JAN1N277M
1AR3CR3	10-20	JAN1N277M
1AR3CR4	10-20	JAN1N277M
1AR3CR5	10-20	JAN1N277M
1AR3CR6	10-19	JAN1N914
1AR3CR7	10-19	JAN1N914
1AR3C1	10-1	TGS50
1AR3C10	10-6	CK63AW103M
1AR3C11	10-7	CK60AW102M
1AR3C12	10-6	CK63AW103M
1AR3C13	10-1	TGS50
1AR3C14	10-6	CK63AW103M
1AR3C15	10-5	CM05D200J03
1AR3C16	10-7	CK60AW102M
1AR3C17	10-1	TGS50
1AR3C18	10-6	CK63AW103M
1AR3C19	10-1	TGS50
1AR3C2	10-7	CK60AW102M
1AR3C20	10-8	CE10C250E
1AR3C21	10-6	CK63AW103M
1AR3C22	10-3	CM05D470J03
1AR3C23	10-2	PC41H180
1AR3C24	9-4	148325-34
1AR3C25	9-4	148325-34
1AR3C26	9-4	148325-34
1AR3C3	10-8	CE10C250E
1AR3C4	10-4	CM05D390J03
1AR3C5	10-6	CK63AW103M
1AR3C6	10-7	CK60AW102M
1AR3C7	10-7	CK60AW102M
1AR3C8	10-4	CM05D390J03
1AR3C9	10-1	TGS50
1AR3E1	9-5A	1481B
1AR3E2	9-5A	1481B
1AR3J2	9-5	50-043-4401
1AR3J3	9-5	50-043-4401
1AR3J4	9-5	50-043-4401
1AR3J5	9-5	50-043-4401
1AR3J6	9-5	50-043-4401
1AR3J7	9-5	50-043-4401
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1A7	1-61	316526-1
1A7C1	6-1	CP05A1KB104K
1A7C2	6-1	CP05A1KB104K
1A7CR1	6-13	JAN1N538
1A7CR2	6-14	JAN1N3023B
1A7CR3	6-13	JAN1N538
1A7CR4	6-14	JAN1N3023B
1A7L1	6-2	MS91189-37
1A7L2	6-2	MS91189-37
1A7Q1	6-18	316815-1
1A7Q10	6-15	316672-1
1A7Q2	6-18	316815-1
1A7Q3	6-17	USAF2N404
1A7Q4	6-16	227082-1
1A7Q5	6-15	316672-1
1A7Q6	6-18	316815-1
1A7Q7	6-18	316815-1
1A7Q8	6-17	USAF2N404
1A7Q9	6-16	227082-1
1A7R1	6-3	RC42GF153J
1A7R10	6-10	RC07GF103J
1A7R11	6-8	RC07GF391J
1A7R12	6-7	RC07GF470J
1A7R13	6-3	RC42GF153J
1A7R14	6-9	RC07GF222J
1A7R15	6-5	RT11C2P502
1A7R16	6-11	RC07GF102J
1A7R17	6-6	RC07GF472J
1A7R18	6-4	RC07GF512J
1A7R19	6-6	RC07GF472J
1A7R2	6-9	RC07GF222J
1A7R20	6-10	RC07GF103J
1A7R21	6-10	RC07GF103J
1A7R22	6-10	RC07GF103J
1A7R23	6-8	RC07GF391J
1A7R24	6-7	RC07GF470J
1A7R3	6-5	RT11C2P502
1A7R4	6-11	RC07GF102J
1A7R5	6-6	RC07GF472J
1A7R6	6-4	RC07GF512J
1A7R7	6-6	RC07GF472J
1A7R8	6-10	RC07GF103J
1A7R9	6-10	RC07GF103J
1A7TP1	6-12	1558-2-05
1A7TP2	6-12	1558-2-05
1A8	1-60	316534-1
1A8CR1	5-37	JAN1N914
1A8CR2	5-36	316504-1
1A8CR3	5-37	JAN1N914
1A8CR4	5-38	JAN1N483B
1A8CR5	5-38	JAN1N483B
1A8CR6	5-39	JAN1N277M
1A8CR7	5-35	316504-3
1A8CR8	5-38	JAN1N483B
1A8C1	5-2	CM05D331J03
1A8C2	5-6	TGS25
1A8C3	5-5	316510-1
1A8C4	5-4	CK60AW102M
1A8C5	5-4	CK60AW102M
1A8C6	5-3	CK63AW103M
1A8C7	5-1	CS13AE100K
1A8C8	5-7	TGP10
1A8C9	5-6	TGS25
1A8L1	5-8	MS75008-42
1A8Q1	5-44	226941-1
1A8Q10	5-46	316815-1
1A8Q2	5-45	USN2N1132
1A8Q3	5-41	316810-1
1A8Q4	5-42	USN2N718A
1A8Q5	5-46	316815-1
1A8Q6	5-46	316815-1
1A8Q7	5-44	226941-1
1A8Q8	5-46	316815-1
1A8Q9	5-46	316815-1
1A8R1	5-11	RJ11BP105
1A8R10	5-29	RC07GF155J
1A8R12	5-23	RC07GF224J
1A8R13	5-24	RC07GF223J
1A8R14	5-12	RC20GF561J
1A8R15	5-21	RC07GF470J
1A8R16	5-10	RT11C2P103
1A8R17	5-12	RC20GF561J
1A8R18	5-9	RT11C2P501
1A8R19	5-14	RC07GF911J
1A8R2	5-32	RC07GF104J
1A8R20	5-20	RC07GF471J
1A8R21	5-34	RC07GF102J
1A8R22	5-31	RC07GF111J
1A8R23	5-17	RC07GF511J
1A8R24	5-9	RT11C2P501
1A8R25	5-12	RC20GF561J
1A8R26	5-30	RC07GF152J
1A8R27	5-16	RC07GF622J
1A8R28	5-18	RC07GF474J
1A8R29	5-13	RC20GF331J
1A8R3	5-19	RC07GF473J
1A8R30	5-32	RC07GF104J
1A8R31	5-22	RC07GF333J
1A8R32	5-15	RC07GF221J
1A8R33	5-27	RC07GF182J
1A8R34	5-17	RC07GF511J
1A8R35	5-28	RC07GF395J
1A8R36	5-18	RC07GF474J
1A8R37	5-17	RC07GF511J
1A8R38	5-30	RC07GF152J
1A8R4	5-33	RC07GF103J
1A8R5	5-34	RC07GF102J
1A8R6	5-25	RC07GF222J
1A8R7	5-14	RC07GF911J
1A8R8	5-26	RC07GF153J
1A8R9	5-24	RC07GF223J
1A8TP1	5-40	1558-2-05
1A8TP2	5-40	1558-2-05
1A8TP3	5-40	1558-2-05
1A8TP4	5-40	1558-2-05
1A9	1-81	316123-1
1A9C1	12-5	316617-1
1A9C2	13-1	CK63AW103M
1A9C3	12-5	316617-1
1A9C4	13-2	TGS50
1A9C5	13-2	TGS50
1A9J1	12-6	50-043-4401
1A9J2	12-6	50-043-4401
1A9J3	12-6	50-043-4401
1A9J4	12-6	50-043-4401
1A9K1	13-3	316631-1
1A9P1	12-1	MS24056-2
1A9Q1	13-11	316815-1
1A9R1	13-6	RC07GF221J
1A9R2	13-4	RC07GF510J
1A9R3	13-9	RC07GF103J
1A9R4	13-5	RC07GF302J
1A9R5	13-8	RC07GF110J
1A9R6	13-7	RC07GF201J
1A9R7	13-3A	RC07GF470J
1A9T1	13-10	317203-1
1CR1	1-52	JAN1N538
1CR2	1-98	JAN1N277M
1C1	1-55	316507-2
1C10	1-103	TGS50
1C11	1-103	TGS50
1C12	1-103	TGS50
1C13	1-103	TGS50
1C14	1-103	TGS50
1C15	1-103	TGS50
1C2	1-56	316507-1
1C3	1-56	316507-1
1C4	1-51	316510-2
1C5	1-13	146131-235
1C6	1-76	CL65CG101MP3
1C7	1-29	CK63AW103M
1C8	1-29	CK63AW103M
1C9	1-102	CK63AW103M
1DS1	1-6	MS25257-3
1E1	1-31	1481B
1E10	1-104	1481B
1E11	1-104	1481B
1E12	1-104	1481B
1E13	1-104	1481B
1E14	1-104	1481B
1E15	1-104	1481B
1E16	1-104	1481B
1E2	1-31	1481B
1E3	1-104	1481B
1E4	1-104	1481B
1E5	1-53	1481B
1E6	1-53	1481B
1E7	1-53	1481B
1E8	1-77	1481B
1E9	1-77	1481B

Reference Designation Index

REFERENCE DESIGNATION	FIG. AND INDEX NO.	MFR PART NUMBER
1FL1	1-92	310023-1
1FL2	1-91	310024-1
1FL3	1-83	316168-1
1FL3C1	14-4	CC20SK0R5C
1FL3C2	14-2	PC40J8R5
1FL3C3	14-2	PC40J8R5
1FL3C4	14-5	CM05D470J03
1FL3C5	14-5	CM05D470J03
1FL3J1	14-3	50-043-4401
1FL3J2	14-3	50-043-4401
1FL3T1	14-6	317201-1
1FL3T2	14-6	317201-1
1F1	1-37	F02B250V1/2AS
1F2	1-37	F02B250V1/2AS
1J1	24-1	316583-1
1J10	1-44	MS16108-5A
1J11	1-44	MS16108-5A
1J12	1-65	MS24055-2
1J13	1-65	MS24055-2
1J14	1-65	MS24055-2
1J15	1-65	MS24055-2
1J16	1-58	MS24013-1
1J17	1-58	MS24013-1
1J18	25-1	316583-1
1J2	1-40	MS35179-1094A
1J4	1-47	227155-1
1J5	1-27	JJ033
1J6	1-44	MS16108-5A
1J7	1-44	MS16108-5A
1J8	1-43	MS16108-3A
1J9	1-44	MS16108-5A
1K1	1-49	226492-1
1K2	1-99	227234-1
1M1	1-14	MR13S5T5DCUAR
1M2	1-25	226406-1
1P1	1-67	MS24055-2
1P2	1-35	99050-1
1P3	24-2	50-007-0000
1P4	25-2	50-011-0000
1P5	29-1	50-011-0000
1P6	29-1	50-011-0000
1R1	1-22	RV6NAYSD502A
1R2	1-18	316508-1
1R3S6	1-16	227005-1
1R4	1-21	RC07GF102J
1R5	1-23	RC07GF223J
1R6	1-54	RC07GF105J
1R7	1-95A	RC07GF624J
1S2	1-48	MS35058-22
1S3	1-17	990163-112
1S4	1-24	990161-114
1S5	1-19	MS35059-22
1S7	1-32	MS35058-21
1S8	1-26	MS35059-23
1TB1	1-39	316505-1
1T1	1-64	316246-1
1T2	1-97	226494-1
1W1	1-89	317166-1
1W1P1	28-1	50-011-0000
1W1P2	28-1	50-011-0000
1W2	1-66	317166-2
1W2P1	28-1	50-011-0000
1W2P2	28-1	50-011-0000
1W3	1-82	317166-3
1W3P1	28-1	50-011-0000
1W3P2	28-1	50-011-0000
1W4	1-87	317166-4
1W4P1	28-1	50-011-0000
1W4P2	28-1	50-011-0000
1XAR2	1-86	SD622SP7
1XA3	1-95	SD622SP2
1XA4	1-96	SD622SP4
1XA7	1-63	SD622SP6
1XA8	1-62	SD622SP9
1XF1	1-38	FHN26G
1XF2	1-38	FHN26G

REFERENCE DESIGNATION	FIG. AND INDEX NO.	MFR PART NUMBER

MFR PART NUMBER	FIG. AND INDEX NO.	QTY PER ART.	SOURCE CODE	REPAIR CODE	EQUIP. SPARES LEVEL

SECTION IV
GROUP ASSEMBLY PARTS LIST

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
1-	316465-1	RADIO RECEIVER R-1283/GRC		1	
-1	316640-1	. COVER ASSEMBLY, TOP		1	
-2	5S35-5	. . STUD, TURNLOCK FASTENER	71286	13	
-2A	5S3-2	. . RING, RETAINING	71286	13	
-3	316630-1	. COVER ASSEMBLY, BOTTOM		1	
-4	317533-1	. . LABEL		1	
-4A	5S35-6	. . STUD, TURNLOCK FASTENER	71286	1	
-5	5S35-5	. . STUD, TURNLOCK FASTENER	71286	9	
-5A	5S3-2	. . RING, RETAINING	71286	10	
-6	MS25257-3	. LIGHT		1	
-7	225525-2	. PLATE, IDENTIFICATION		1	
		ATTACHING PARTS			
	AN535-0-2	. SCREW		4	
		---*---			
(8)	SCH742-3BB40806	. KNOB	75376	2	
-9	MS16624-4025	. RING		4	
-10	316533-1	. BUSHING, MACHINE THREAD		2	
-11	316684-1	. SHAFT, SHOULDERED		1	
-12	316684-2	. SHAFT, SHOULDERED		1	
		ATTACHING PARTS			
	MS35125-2	. NUT		2	
	MS35333-76	. WASHER		2	
		---*---			
-13	146131-235	. CAPACITOR, FIXED, ELECTROLYTIC, 0.50 µf, 20%, 35 wvdc		1	
-14	MR13S5T5DCUAR	. AMMETER		1	
-15	MS91528-1E2B	. KNOB		5	
-16	227005-1	. RESISTOR, VARIABLE, COMPOSITION, 100,000 ohms, 10%		1	
-17	990163-112	. SWITCH, ROTARY		1	
(18)	316508-1	. RESISTOR, VARIABLE, COMPOSITION, R1 500 ohms, R2 10,000 ohms, 10%		1	
-19	MS35059-22	. SWITCH		1	
-20	MS91528-1E1B	. KNOB		1	
-21	RC07GF102J	. RESISTOR		1	
-22	RV6NAYSD502A	. RESISTOR		1	
-23	RC07GF223J	. RESISTOR		1	
-24	990161-114	. SWITCH, ROTARY		1	
-25	226406-1	. AMMETER, DC, range 0 to 100 µa, scale marked -8 to 0 to +6 db		1	
-26	MS35059-23	. SWITCH		1	
-27	JJ033	. JACK		1	
(28)	316425-2	. HANDLE, BOW		2	
		ATTACHING PARTS			
	MS35233-42	. SCREW		4	
	MS35338-80	. WASHER		4	
		---*---			
-29	CK63AW103M	. CAPACITOR		2	
-30	2916-04-01	. TERMINAL, LUG	78189	1	
		ATTACHING PARTS			
	MS35233-14	. SCREW		1	
	58FH440	. NUT, SELF-LOCKING, HEXAGON, No. 4-40 thd	56878	1	
		---*---			
-31	1481B	. TERMINAL, STUD	15849	2	
		ATTACHING PARTS			
	MS35233-1	. SCREW		2	
	DELETED	. WASHER		2	
		---*---			
-32	MS35058-21	. SWITCH		1	
-33	990076-1	. ADAPTER, CONNECTOR		1	
-34	SR5P1	. BUSHING, STRAIN RELIEF, CABLE	28520	1	
-35	990050-1	. CABLE ASSEMBLY, POWER		1	
-36	317166-5	. CABLE ASSEMBLY, RADIO FREQUENCY, 8-1/4 inches, See Fig. 24		1	

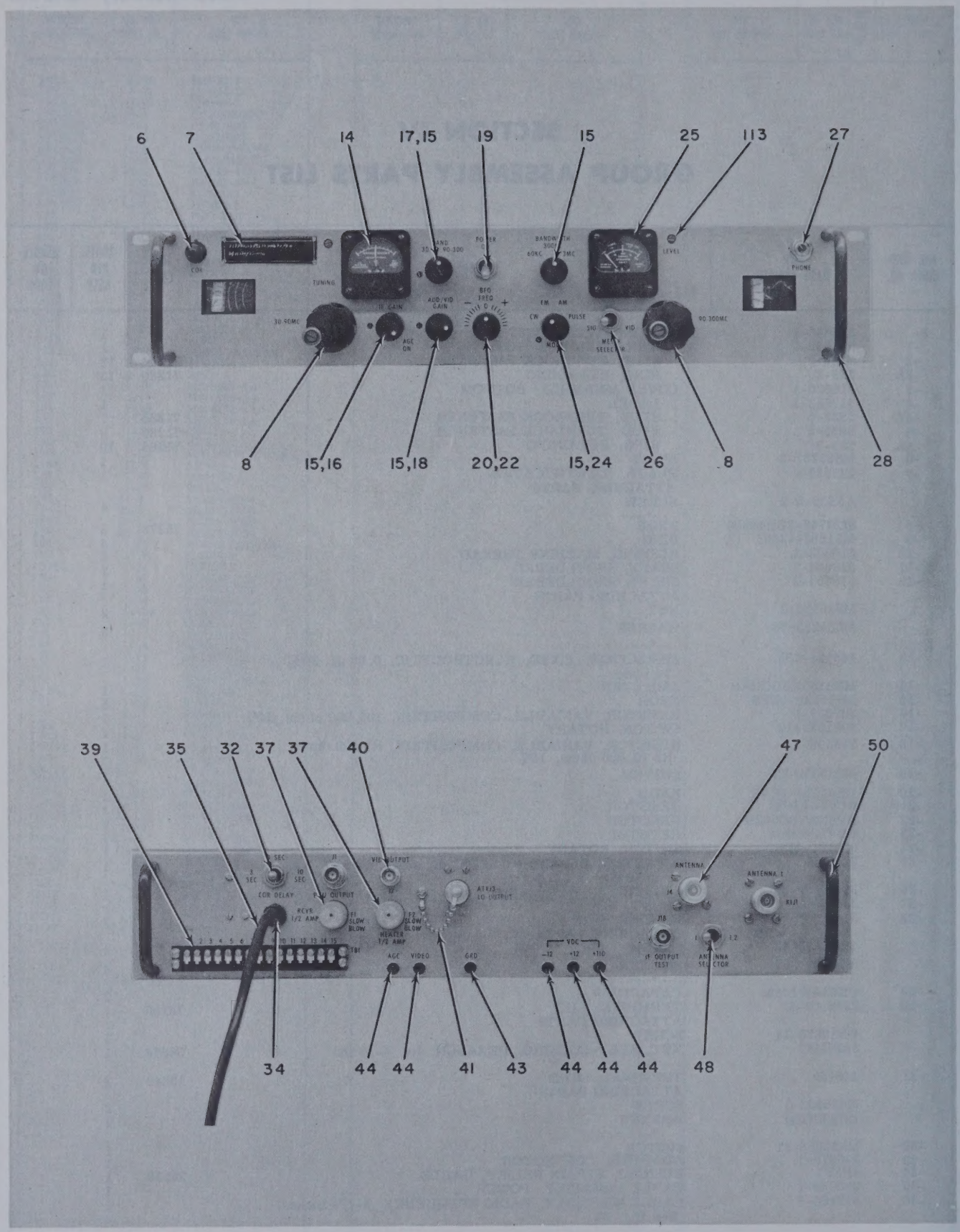

Figure 1. Radio Receiver R-1283/GRC (Sheet 1 of 3)

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
1-37	F02B250V1/2AS	. FUSE		2	
-38	FHN26G	. FUSEHOLDER		2	
-39	410Y15	. TERMINAL BOARD Sup D	75382	1	
		ATTACHING PARTS			
See Sup D	MS16995-11	. SCREW		4	
	MS15795-803	. WASHER		4	
	58FH440	. NUT, SELF-LOCKING, HEXAGON, No. 4-40 thd	56878	4	
		---*---			
-40	MS35179-1094A	. CONNECTOR		1	
-41	MS35186-123A	. CAP AND CHAIN ASSEMBLY		1	
		ATTACHING PARTS			
	MS35233-14	. SCREW		1	
	58FH440	. NUT, SELF-LOCKING, HEXAGON, No. 4-40 thd	56878	1	
		---*---			
-42	316124-1	. OUTPUT ASSEMBLY, LOCAL OSCILLATOR, See Fig. 2		1	
		ATTACHING PARTS			
	MS35233-3	. SCREW		4	
		---*---			
-43	MS16108-3A	. JACK		1	
-44	MS16108-5A	. JACK		5	
-45	317166-6	. CABLE ASSEMBLY, RADIO FREQUENCY, 1 foot, 2-1/8 inches, See Fig. 25		1	
-46	MS35173-274B	. ADAPTER		1	
-47	227155-1	. ADAPTER, CONNECTOR		1	
		ATTACHING PARTS			
	MS35233-14	. SCREW		4	
	58FH440	. NUT, SELF-LOCKING, HEXAGON, No. 4-40 thd	56878	4	
		---*---			
-48	MS35058-22	. SWITCH		1	
-49	94CSA1-2-202	. RELAY, ARMATURE (MFG 94375) (226492-1, MFG 00752)		1	
		ATTACHING PARTS			
	MS35233-13	. SCREW		4	
	MS35338-78	. WASHER		4	
		---*---			
-50	316425-1	. HANDLE, BOW		2	
		ATTACHING PARTS			
	MS35233-42	. SCREW		4	
	MS35338-80	. WASHER		4	
		---*---			
-51	316510-2	. CAPACITOR, FIXED, PLASTIC, 1 µf, 10% 200 wvdc		1	
-52	JAN1N538	. SEMICONDUCTOR DEVICE		1	
-53	1481B	. TERMINAL, STUD	15849	3	
		ATTACHING PARTS			
	MS35249-8	. SCREW		3	
	DELETED	. WASHER		3	
		---*---			
-54	RC07GF105J	. RESISTOR		1	
-55	316507-2	. CAPACITOR, FIXED, ELECTROLYTIC, 175 µf, +75 -10%, 200 wvdc		1	
-56	316507-1	. CAPACITOR, FIXED, ELECTROLYTIC, 1000 µf, +100, -10%, 25 wvdc		2	
-57	316506-1	. RETAINER, CAPACITOR		3	
		ATTACHING PARTS			
	MS35233-18	. SCREW		3	
	MS35338-78	. WASHER		3	
	MS35649-44	. NUT		3	
	MS35233-15	. SCREW		6	
	MS15795-803	. WASHER		6	
	58FH440	. NUT, SELF-LOCKING, HEXAGON, No. 4-40 thd	56878	6	
		---*---			
-58	MS24013-1	. CONNECTOR		2	
-59	316365-1	. TUNER ASSEMBLY, BAND A, See Fig. 3		1	
		ATTACHING PARTS			
	MS35233-15	. SCREW		6	
	MS35338-78	. WASHER		6	
	MS15795-803	. WASHER		6	
		---*---			
-60	316534-1	. AUTOMATIC GAIN CONTROL ASSEMBLY, See Fig. 5		1	
-61	316526-1	. HEATER ASSEMBLY, See Fig. 6		1	
-62	SD622SP9	. CONNECTOR, RECEPTACLE, ELECTRICAL	95354	1	

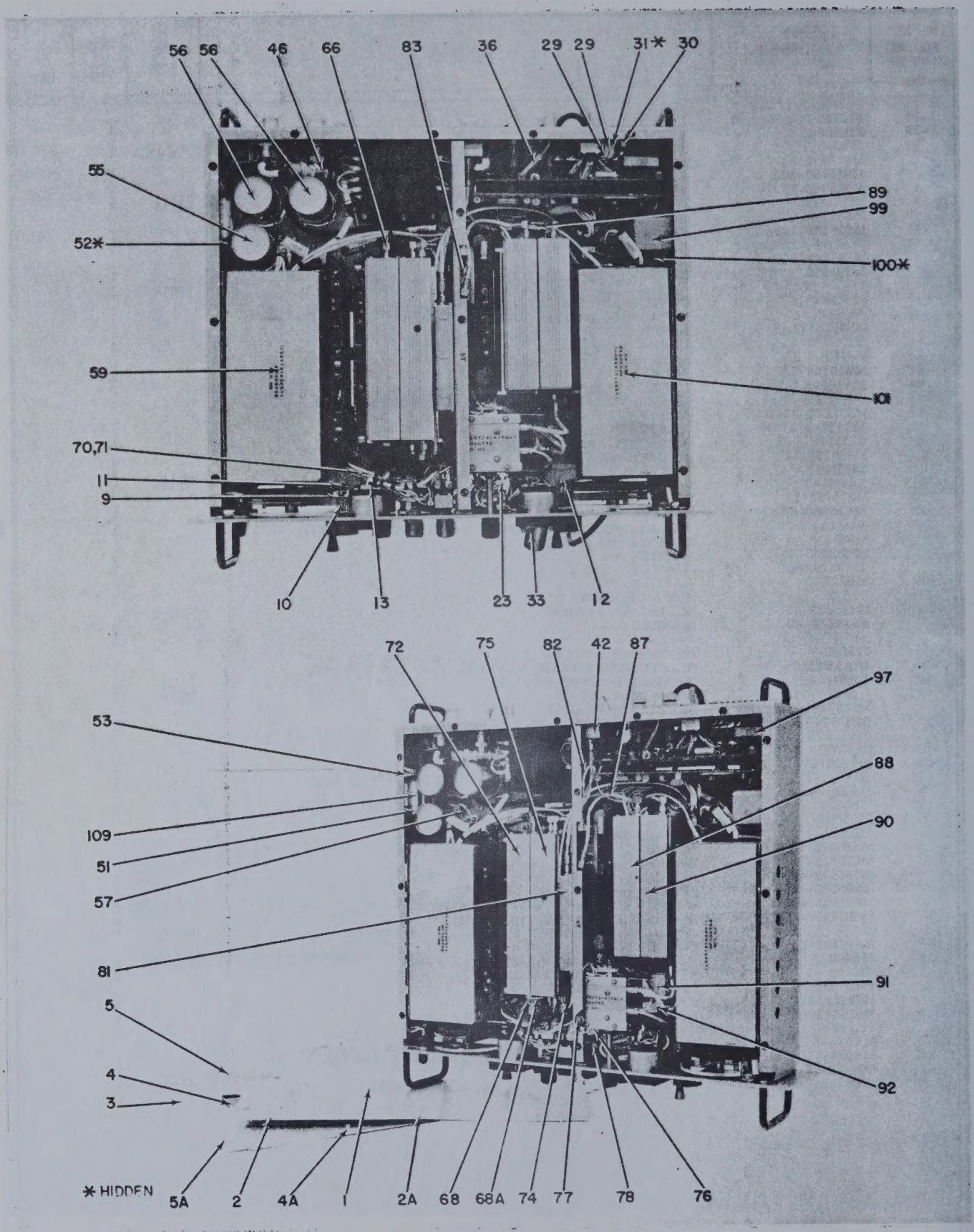

Figure 1. Radio Receiver R-1283/GRC (Sheet 2 of 3)

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
1 -63	SD622SP6	. CONNECTOR, RECEPTACLE, ELECTRICAL	95354	1	
		ATTACHING PARTS			
	MS35233-18	. SCREW		4	
	MS15795-803	. WASHER		8	
	58FH440	. NUT, SELF-LOCKING, HEXAGON, No. 4-40 thd	56878	4	
		---*---			
-64	316246-1	. TRANSFORMER, POWER, STEP-DOWN, Primary winding 115 vac 60 cps, secondary windings 26 vrms 450 ma, 7.2 vrms 0.5 a, 92 vrms, 30 ma		1	
		ATTACHING PARTS			
	MS35233-28	. SCREW		1	
	MS35233-29	. SCREW		3	
	MS15795-805	. WASHER		4	
	58FH632	. NUT, SELF-LOCKING, HEXAGON, No. 6-32 thd	56878	4	
		---*---			
-65	MS24055-2	. CONNECTOR		4	
-66	317166-2	. CABLE ASSEMBLY, RADIO FREQUENCY, 4-1/2 inches, See Fig. 28		1	
-67	MS24055-2	. CONNECTOR		1	
-68	MS24018-6	. HOOD		1	
-68A	MS24120-2	. RING		1	
-69	317154-20	. SLEEVE, MARKER, CABLE		1	
-70	Y0E90	. FERRULE, RADIO FREQUENCY CABLE, GROUNDING, Outer	09922	18	
-71	GSB071	. FERRULE, RADIO FREQUENCY CABLE, GROUNDING, Inner	59730	18	
-72	316538-1	. DISCRIMINATOR ASSEMBLY, See Fig. 7		1	
		ATTACHING PARTS			
	MS35233-27	. SCREW		4	
	MS35338-79	. WASHER		4	
		---*---			
-73	317175-1	. CABLE ASSEMBLY, RADIO FREQUENCY, 3-1/8 inches, See Fig. 29		1	
-74	317175-2	. CABLE ASSEMBLY, RADIO FREQUENCY, 3-1/8 inches, See Fig. 29		1	
-75	316547-1	. LIMITER ASSEMBLY, See Fig. 9		1	
		ATTACHING PARTS			
	MS35233-27	. SCREW		4	
	MS35338-79	. WASHER		4	
		---*---			
-76	CL65CG101MP3	. CAPACITOR		1	
-77	1481B	. TERMINAL, STUD	15849	2	
		ATTACHING PARTS			
	MS35233-1	. SCREW		2	
	DELETED	. WASHER		2	
		---*---			
-78	2916-04-01	. TERMINAL, LUG	78189	2	
		ATTACHING PARTS			
	MS35233-14	. SCREW		1	
	58FH440	. NUT, SELF-LOCKING, HEXAGON, No. 4-40 thd	56878	1	
		---*---			
-79	MS35489-6	. GROMMET		1	
-80	316166-1	. SELECTOR ASSEMBLY, BANDWIDTH, See Fig. 11		1	
		ATTACHING PARTS			
	MS35233-3	. SCREW		4	
		---*---			
-81	316123-1	. AMPLIFIER ASSEMBLY, COMBINING, See Fig. 12		1	
		ATTACHING PARTS			
	MS35233-15	. SCREW		3	
		---*---			
-82	317166-3	. CABLE ASSEMBLY, RADIO FREQUENCY, 4-1/8 inches, See Fig. 28		1	
-83	316168-1	. FILTER ASSEMBLY, 500 KC, See Fig. 14		1	
		ATTACHING PARTS			
	MS35233-3	. SCREW		3	
		---*---			
-84	MS21266-2N	. GROMMET		AR	
-85	316438-1	. AMPLIFIER ASSEMBLY, VIDEO, See Fig. 15		1	
-86	SD622SP7	. CONNECTOR, RECEPTACLE, ELECTRICAL	95354	1	
		ATTACHING PARTS			
	MS35233-18	. SCREW		2	
	MS15795-803	. WASHER		2	
	58FH440	. NUT, SELF-LOCKING, HEXAGON, No. 4-40 thd	56878	2	
		---*---			
-87	317166-4	. CABLE ASSEMBLY, RADIO FREQUENCY, 6-7/8 inches, See Fig. 28		1	

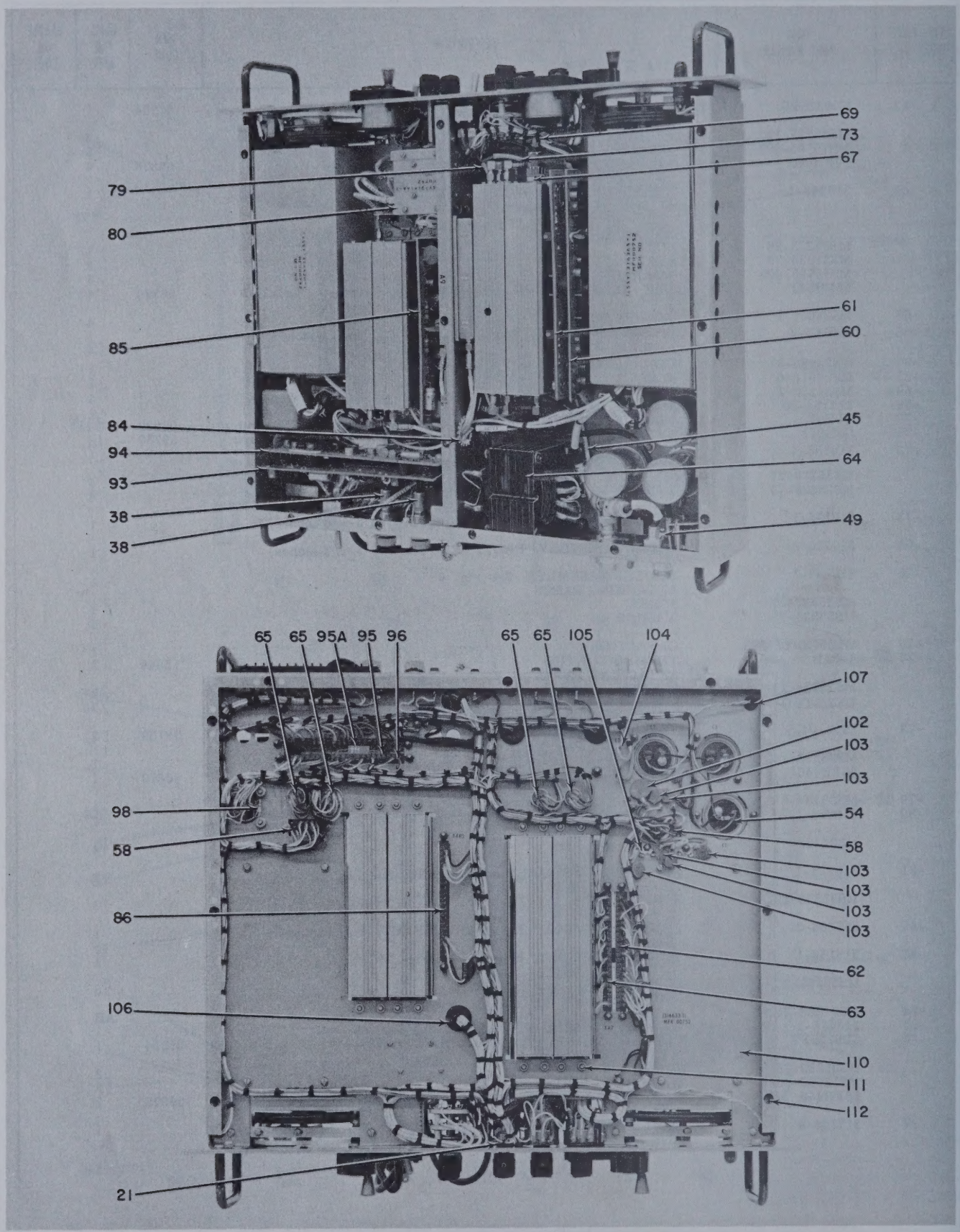

Figure 1. Radio Receiver R-1283/GRC (Sheet 3 of 3)

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
1-88	316514-1	. BEAT-FREQUENCY OSCILLATOR ASSEMBLY, See Fig. 16		1	
		ATTACHING PARTS			
	MS35233-27	. SCREW		4	
	MS35338-79	. WASHER		4	
		---*---			
-89	317166-1	. CABLE ASSEMBLY, RADIO FREQUENCY, 1 foot, 1-3/8 inches, See Fig. 28		1	
-90	224804-1	. AMPLIFIER ASSEMBLY, INTERMEDIATE FREQUENCY, See Fig. 18		1	
		ATTACHING PARTS			
	MS35233-27	. SCREW		4	
	MS35338-79	. WASHER		4	
		---*---			
-91	310024-1	. FILTER, BAND PASS, 21.4 mc, 300 kc ±25 kc bandwidth		1	
-92	310023-1	. FILTER, BAND PASS, 21.4 mc, 60 kc ±5 kc bandwidth		1	
		ATTACHING PARTS			
	MS35233-3	. SCREW		4	
	MS35338-77	. WASHER		4	
		---*---			
-93	316543-1	. POWER SUPPLY, See Fig. 20		1	
-94	316439-1	. AUDIO ASSEMBLY, CARRIER OPERATED RELAY, See Fig. 21		1	
-95	SD622SP2	. CONNECTOR, RECEPTACLE, ELECTRICAL	95354	1	
-95A	RC07GF624J	. RESISTOR		1	
-96	SD622SP4	. CONNECTOR, RECEPTACLE, ELECTRICAL	95354	1	
		ATTACHING PARTS			
	MS35233-18	. SCREW		4	
	MS15795-803	. WASHER		8	
	58FH440	. NUT, SELF-LOCKING, HEXAGON, No. 4-40 thd	56878	4	
		---*---			
-97	226494-1	. TRANSISTOR, AUDIO FREQUENCY, Primary winding 500 ohms center tap, secondary winding 200 ohms center tap		1	
		ATTACHING PARTS			
	MS35233-27	. SCREW		2	
	58FH632	. NUT, SELF-LOCKING, HEXAGON, No. 6-32 thd	56878	2	
		---*---			
-98	JAN1N277M	. SEMICONDUCTOR DEVICE		1	
-99	227234-1	. RELAY, ARMATURE, coil 16 vdc, 0.11 amp, 15 millisec operating time		1	
		ATTACHING PARTS			
	MS35649-64	. NUT		3	
	MS35338-79	. WASHER		3	
		---*---			
-100	316131-2	. SPACER, SLEEVE		3	
-101	316520-1	. TUNER ASSEMBLY, BAND B, See Fig. 22		1	
		ATTACHING PARTS			
	MS35233-15	. SCREW		6	
	MS35338-78	. WASHER		6	
	MS15795-803	. WASHER		6	
		---*---			
-102	CK63AW103M	. CAPACITOR		1	
-103	TGS50	. CAPACITOR, FIXED, CERAMIC DIELECTRIC, 0.05 µf, +80%, -20%, 50 wvdc	56289	6	
-104	1481B	. TERMINAL, STUD	15849	9	
		ATTACHING PARTS			
	MS35233-1	. SCREW		9	
	DELETED	. WASHER		9	
		---*---			
-105	2916-04-01	. TERMINAL, LUG	78189	7	
		ATTACHING PARTS			
	MS35233-14	. SCREW		6	
	58FH440	. NUT, SELF-LOCKING, HEXAGON, No. 4-40 thd	56878	6	
		---*---			
-106	MS35489-9	. GROMMET		4	
-107	MS35489-4	. GROMMET		4	
-108	DELETED	. PLATE MOUNTING		8	
	316633-1	. CHASSIS, ELECTRICAL EQUIPMENT		1	
-109	6016-14C	. . CLIP, SPRING TENSION	91506	1	
		ATTACHING PARTS			
	MS20426AD4-4	. . RIVET		2	
		---*---			
	316633-6	. . CHASSIS, ELECTRICAL EQUIPMENT		1	
-110	316039-1	. . . CHASSIS, ELECTRICAL EQUIPMENT		1	
-111	CLS632-2	. . . . NUT, PLAIN, CLINCH	46384	16	
-112	5R2-3	. . . . RECEPTACLE, TURNLOCK FASTENER	71286	23	
		ATTACHING PARTS			
	MS20426AD3-4	. . . . RIVET		46	
		---*---			
-113	AN535-4-5	. . . . SCREW		2	

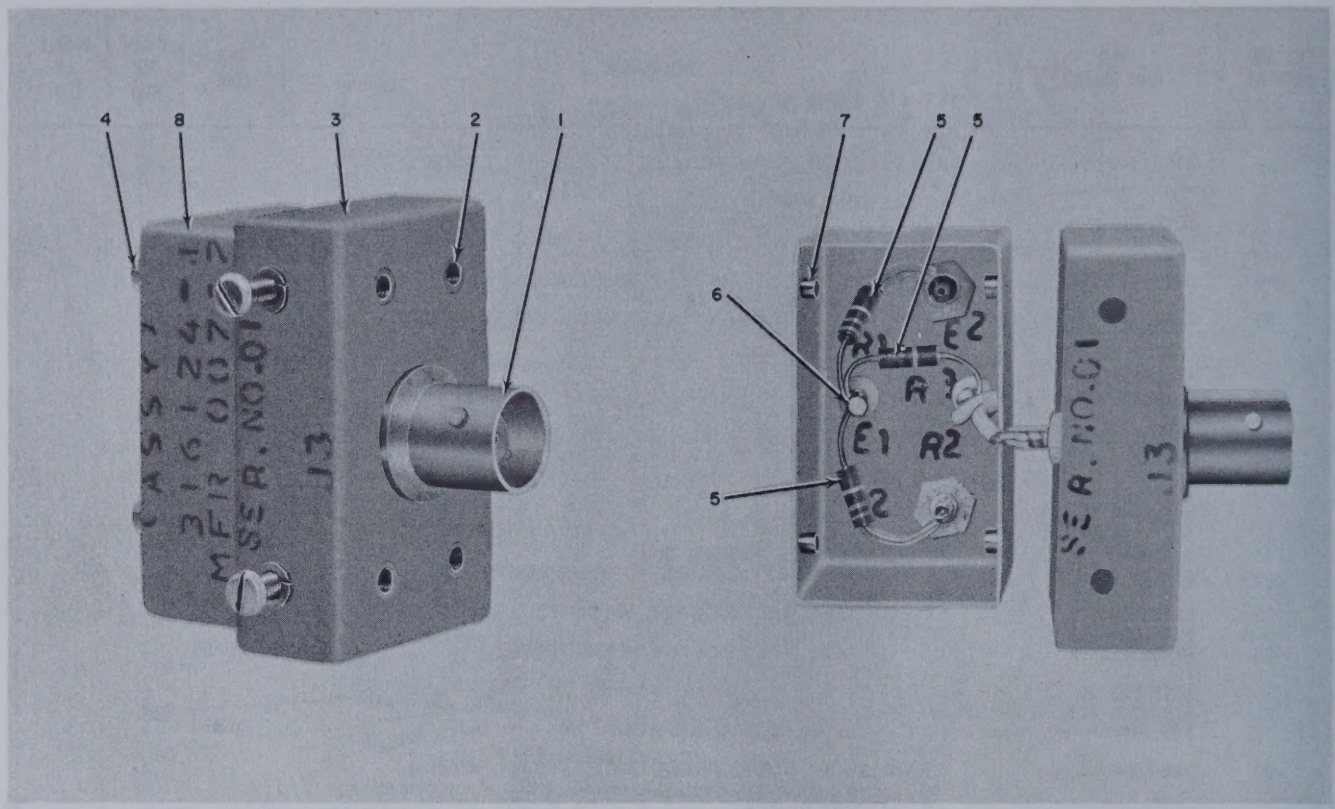

Figure 2. Local Oscillator Output Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
2-	316124-1	. OUTPUT ASSEMBLY, LOCAL OSCILLATOR, See Fig. 1-42 for NHA		REF	
-1	MS35179-1094A	. . CONNECTOR		1	
	316223-1	. . COVER ASSEMBLY, OUTPUT		1	
		ATTACHING PARTS			
	MS35233-3	. . SCREW		4	
		---*---			
-2	UL256-1	. . . NUT, SELF-LOCKING, CLINCH	46384	4	
-3	316223-6	. . . COVER, OUTPUT		1	
-4	50-043-4401	. . CONNECTOR, RECEPTACLE, ELECTRICAL	98291	2	
-5	RC07GF220J	. . RESISTOR		3	
	316222-1	. . CHASSIS, ELECTRICAL EQUIPMENT		1	
-6	STSM1TUR	. . . TERMINAL, STUD	98291	2	
-7	UL256-1	. . . NUT, SELF-LOCKING, CLINCH	46384	4	
-8	316222-6	. . . CHASSIS, ELECTRICAL EQUIPMENT		1	

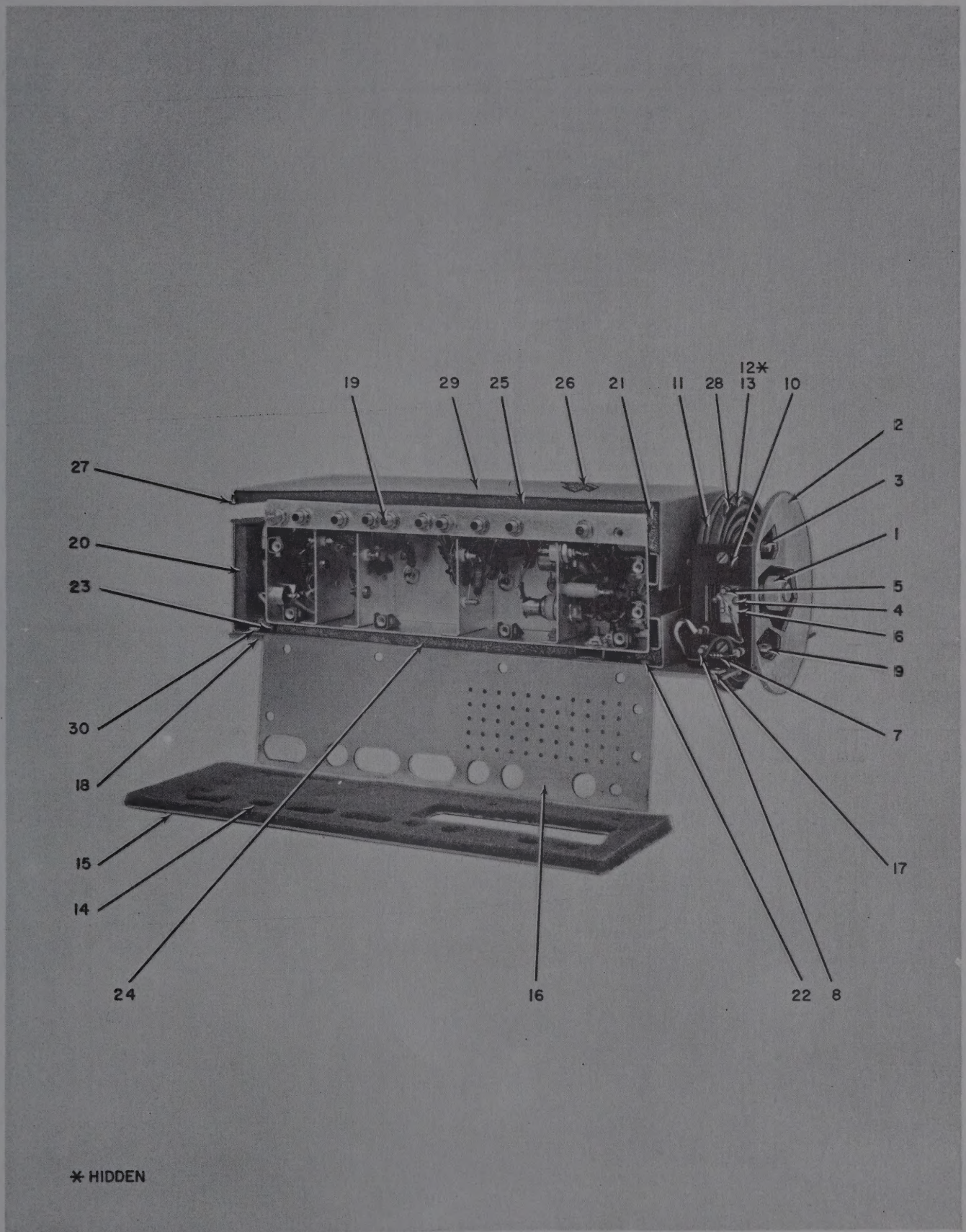

Figure 3. Band A Tuner Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
3-	316365-1	. TUNER ASSEMBLY, BAND A, See Fig. 1-59 for NHA		REF	
	317321-1	. . DIAL, CALIBRATED		1	
-1	226971-2	. . . HUB, DIAL		1	
-2	317321-6	. . . DIAL, CALIBRATED		1	
-3	316399-1	. . ROD, END		2	
		ATTACHING PARTS			
	MS35233-4	. . SCREW		4	
	MS35338-77	. . WASHER		4	
	MS15795-802	. . WASHER		8	
		---*---			
-4	683	. . LAMP, INCANDESCENT	24455	1	
	316427-1	. . INDICATOR ASSEMBLY, DIAL		1	
-5	1KD3-9D	. . . TERMINAL, STUD	86577	2	
-6	316427-6	. . . INDICATOR, DIAL		1	
-7	RC07GF220J	. . RESISTOR		1	
	316406-1	. . BRACKET ASSEMBLY, TUNER		1	
		ATTACHING PARTS			
	MS35233-14	. . SCREW		2	
	MS35338-78	. . WASHER		2	
	MS15795-803	. . WASHER		2	
		---*---			
-8	STSM16TUR	. . . TERMINAL, STUD	98291	3	
-9	CLS440-2	. . . NUT, PLAIN, CLINCH	46384	2	
-10	316406-6	. . . BRACKET, SUPPORT		1	
-11	AN6230-10	. . GASKET		1	
	316177-1	. . CAM ASSEMBLY, SPIRAL		1	
-12	317309-1	. . . HUB, CAM		1	
		ATTACHING PARTS			
	AN565AC6H2	. . . SETSCREW		2	
		---*---			
-13	316177-6	. . . CAM, SPIRAL		1	
	316587-1	. . COVER ASSEMBLY, TUNER		1	
		ATTACHING PARTS			
	MS35233-14	. . SCREW		8	
		---*---			
-14	316586-1	. . . SHEET, INSULATION		1	
-15	316559-1	. . . COVER, TUNER		1	
-16	331874-1	. . COVER, TUNER		1	
	316414-1	. . PLATE ASSEMBLY, SUPPORT		1	
		ATTACHING PARTS			
	AN507C440-3	. . SCREW		4	
		---*---			
-17	CLS440-2	. . . NUT, PLAIN, CLINCH	46384	2	
-18	316414-6	. . . PLATE, SUPPORT		1	
-19	316257-1	. . BAND A ASSEMBLY, RADIO FREQUENCY, See Fig. 4		1	
		ATTACHING PARTS			
	AN507C440-7	. . SCREW		3	
	MS35233-14	. . SCREW		2	
		---*---			
	316468-1	. . CHASSIS, ELECTRICAL EQUIPMENT		1	
-20	316451-1	. . . SHEET, INSULATION		1	
-21	316452-1	. . . SHEET, INSULATION		1	
-22	316453-1	. . . SHEET, INSULATION		1	
-23	316454-1	. . . SHEET, INSULATION		1	
-24	316455-1	. . . SHEET, INSULATION		1	
-25	316456-1	. . . SHEET, INSULATION		1	
-26	316456-2	. . . SHEET, INSULATION		1	
-27	MS21266-1N	. . . GROMMET		AR	
-28	MS35489-4	. . . GROMMET		1	
-29	316415-1	. . . CHASSIS, ELECTRICAL EQUIPMENT		1	
-30	CLS440-1	. . . . NUT, PLAIN, CLINCH	46384	8	

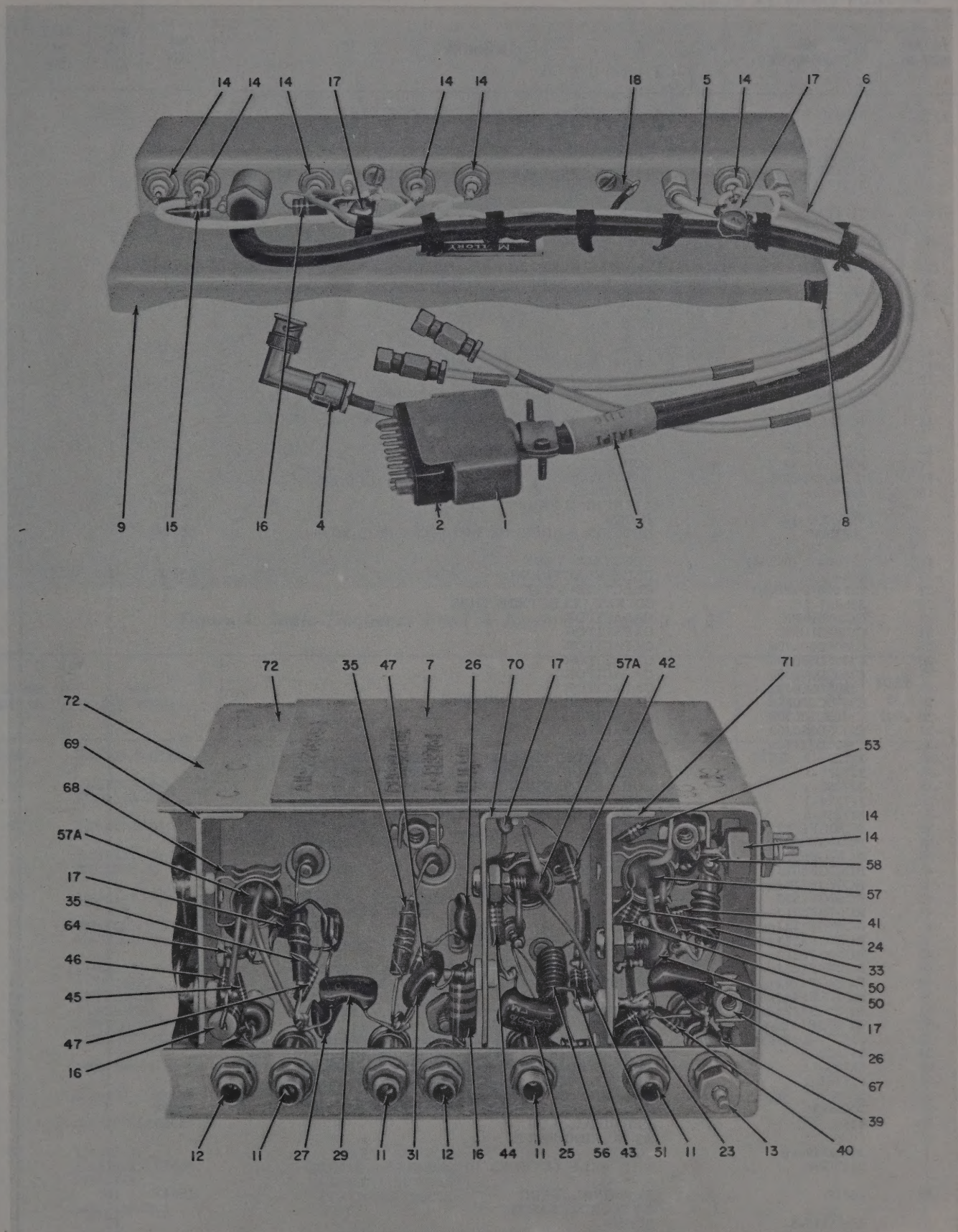

Figure 4. Radio Frequency Band A Assembly (Sheet 1 of 2)

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
4-	316257-1	. . BAND A ASSEMBLY, RADIO FREQUENCY See Fig. 3-19 for NHA		REF	
-1	MS24132R5	. . . HOOD		1	
-2	MS24014-1	. . . CONNECTOR		1	
-3	317154-1	. . . SLEEVE, MARKER, CABLE		1	
-4	317179-1	. . . CABLE ASSEMBLY, RADIO FREQUENCY, 11-1/2 inches, See Fig. 26		1	
-5	317179-2	. . . CABLE ASSEMBLY, RADIO FREQUENCY, 9-1/2 inches, See Fig. 27		1	
-6	317179-3	. . . CABLE ASSEMBLY, RADIO FREQUENCY, 9-1/4 inches, See Fig. 27		1	
-7	SLPSA	. . . HEATING ELEMENT, ELECTRICAL, 266 ohms, 10%, 50 w	13426	1	
-8	ZX4116	. . . CHANNEL, RUBBER	76385	AR	
-9	226978-1	. . . TUNER, INDUCTANCE		1	
		ATTACHING PARTS			
	MS35233-14	. . . SCREW		6	
		---*---			
-10	333	. . . TERMINAL, LUG	79963	2	
-11	PC40J8R5	. . . CAPACITOR		7	
-12	PC40J4R5	. . . CAPACITOR		2	
-13	226986-1	. . . COIL, RADIO FREQUENCY, Variable, range 0.50 µh to 0.60 µh		1	
-14	148325-34	. . . CAPACITOR, FIXED, CERAMIC DIELECTRIC, 1000 µµf, 20%, 500 wvdc		9	
-15	MS75008-25	. . . COIL		1	
-16	MS75008-42	. . . COIL		5	
-17	CK60AW102M	. . . CAPACITOR		11	
-18	333	. . . TERMINAL, LUG	79963	4	
		ATTACHING PARTS			
	MS35233-14	. . . SCREW		4	
	58FH440	. . . NUT, SELF-LOCKING, HEXAGON, No. 4-40 thd	56878	4	
		---*---			
-19	227004-1 (6CW4)	. . . ELECTRON TUBE		1	
-20	1454	. . . CLIP, ELECTRICAL	83330	1	
-21	227206-1 (8058)	. . . ELECTRON TUBE		1	
-22	226987-1	. . . SOCKET, ELECTRON TUBE		2	
-23	CC20SH080C	. . . CAPACITOR		1	
-24	CC20SH100C	. . . CAPACITOR		1	
-25	CM05D101J03	. . . CAPACITOR		1	
-26	CM05D680J03	. . . CAPACITOR		2	
-27	CM05D240J03	. . . CAPACITOR		1	
-28	CM05D510J03	. . . CAPACITOR		1	
-29	CM05C080K03	. . . CAPACITOR		2	
-30	CM05D200J03	. . . CAPACITOR		1	
-31	CM05D330J03	. . . CAPACITOR		3	
-32	CM05D221J03	. . . CAPACITOR		1	
-33	227235-3	. . . COIL, RADIO FREQUENCY, 0.060 µh		1	
-34	227235-1	. . . COIL, RADIO FREQUENCY, 0.280 µh		1	
-35	227235-2	. . . COIL, RADIO FREQUENCY, 0.050 µh		4	
-36	317279-1	. . . COIL, RADIO FREQUENCY, 18 µh		1	
-37	227235-5	. . . COIL, RADIO FREQUENCY, 0.0385 µh		1	
-38	RC20GF112J	. . . RESISTOR		1	
-39	RC07GF680J	. . . RESISTOR		1	
-40	RC07GF682J	. . . RESISTOR		1	
-41	RC07GF302J	. . . RESISTOR		1	
-42	RC07GF272J	. . . RESISTOR		1	
-43	RC07GF153J	. . . RESISTOR		1	
-44	RC07GF201J	. . . RESISTOR		1	
-45	RC07GF152J	. . . RESISTOR		1	
-46	RC07GF332J	. . . RESISTOR		1	
-47	RC07GF621J	. . . RESISTOR		3	
-48	RC07GF102J	. . . RESISTOR		1	
-49	RC07GF470J	. . . RESISTOR		2	
-50	RC07GF103J	. . . RESISTOR		3	
-51	RC07GF472J	. . . RESISTOR		3	
-52	RC07GF473J	. . . RESISTOR		1	
-53	316675-1	. . . RESISTOR, THERMAL, 5000 ohms, 10%, 4 mw		1	
-54	317282-1	. . . TRANSFORMER, RADIO FREQUENCY, 0.34 µh to 2.45 µh		1	
-55	317280-1	. . . TRANSFORMER, RADIO FREQUENCY, 0.46 µh to 4.2 µh		1	
-56	317281-1	. . . TRANSFORMER, RADIO FREQUENCY, 0.4 µh to 8.0 µh		1	
-57	2N2398	. . . TRANSISTOR, Germanium, PNP, (26988-1)	56289	1	
-57A	2N2398	. . . TRANSISTOR, Germanium, PNP, (26988-2)	56289	2	
-58	426	. . . TERMINAL, LUG	79963	1	
		ATTACHING PARTS			
	MS35249-10	. . . SCREW		1	
	58FH256	. . . NUT, SELF-LOCKING, HEXAGON, No. 2-56 thd	56878	1	
		---*---			
-59	1481B	. . . TERMINAL, STUD	15849	10	
		ATTACHING PARTS			
	MS35249-8	. . . SCREW		10	
	MS35338-77	. . . WASHER		10	
	MS15795-802	. . . WASHER		10	
		---*---			

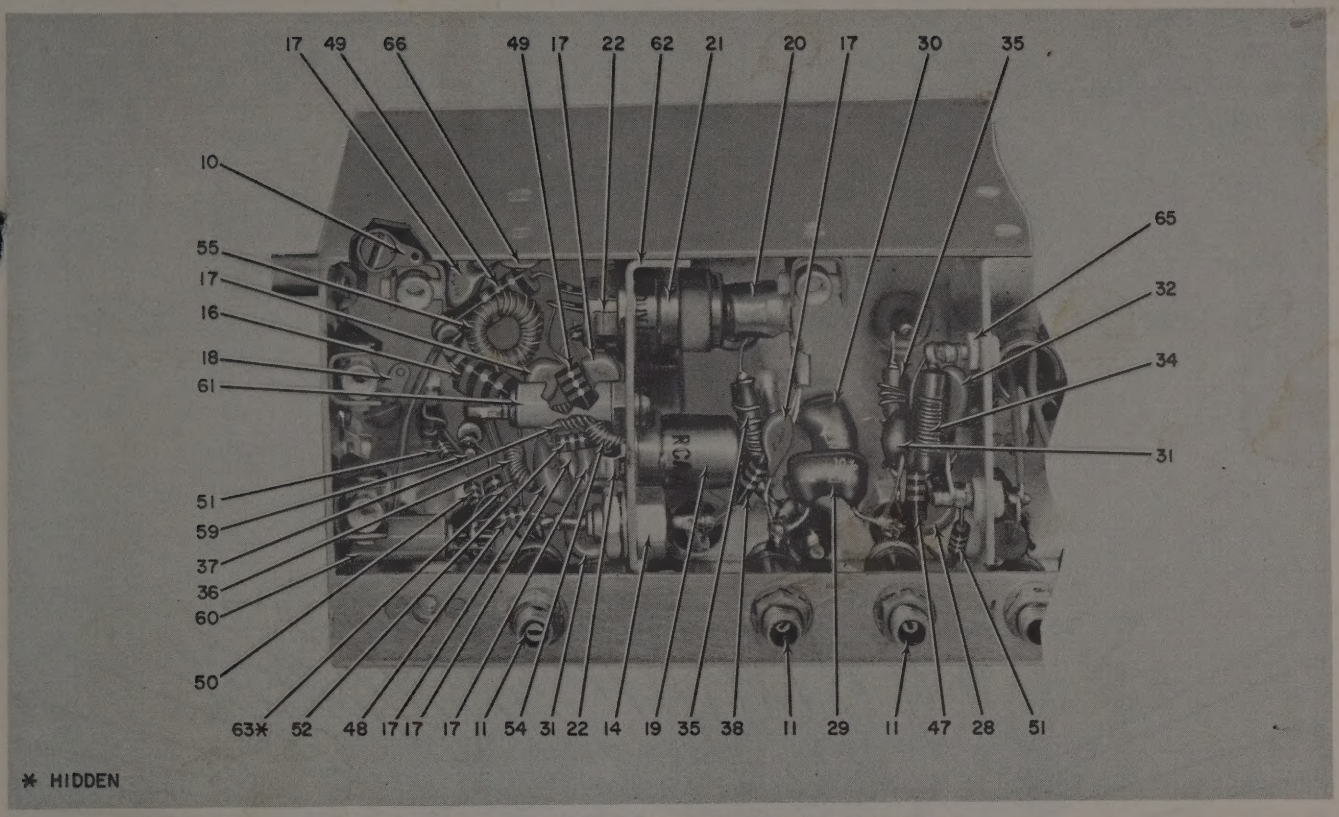

Figure 4. Radio Frequency Band A Assembly (Sheet 2 of 2)

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
4-60	ES5103-2-0516	. . . TERMINAL, STUD	71279	1	
		ATTACHING PARTS			
	AN507C440-3	. . . SCREW		1	
	MS35338-78	. . . WASHER		1	
		---*---			
-61	ES5103-2-0516	. . . TERMINAL, STUD	71279	1	
		ATTACHING PARTS			
	MS35233-12	. . . SCREW		1	
	MS35338-78	. . . WASHER		1	
		---*---			
-62	331873-1	. . . BRACKET, SUPPORT		1	
		ATTACHING PARTS			
	MS35249-11	. . . SCREW		7	
	58FH256	. . . NUT, SELF-LOCKING, HEXAGON, No. 2-56 thd	56878	7	
		---*---			
	331831-1	. . . CHASSIS, ELECTRICAL EQUIPMENT		1	
-63	STSM16TUR	. . . . TERMINAL, STUD	98291	1	
-64	STSM1TUR	. . . . TERMINAL, STUD	98291	5	
-65	FTSM4TUR	. . . . TERMINAL, FEEDTHRU, INSULATED	98291	4	
-66	LHTA3300-40	. . . . NUT, SELF-LOCKING, PLATE	72962	6	
-67	LHA27M2860-40	. . . . NUT, SELF-LOCKING, PLATE	72962	7	
		ATTACHING PARTS			
	MS20426A2-3	. . . . RIVET		26	
		---*---			
-68	6024-4A	. . . . CLIP, SPRING, TENSION	91506	3	
		ATTACHING PARTS			
	MS20470A2-3	. . . . RIVET		3	
		---*---			
-69	331831-7	. . . . BRACKET, SUPPORT		1	
-70	331831-8	. . . . BRACKET, SUPPORT		1	
-71	331831-9	. . . . BRACKET, SUPPORT		1	
		ATTACHING PARTS			
	MS20426A2-3	. . . . RIVET		12	
		---*---			
-72	331831-6	. . . . CHASSIS, ELECTRICAL EQUIPMENT		1	

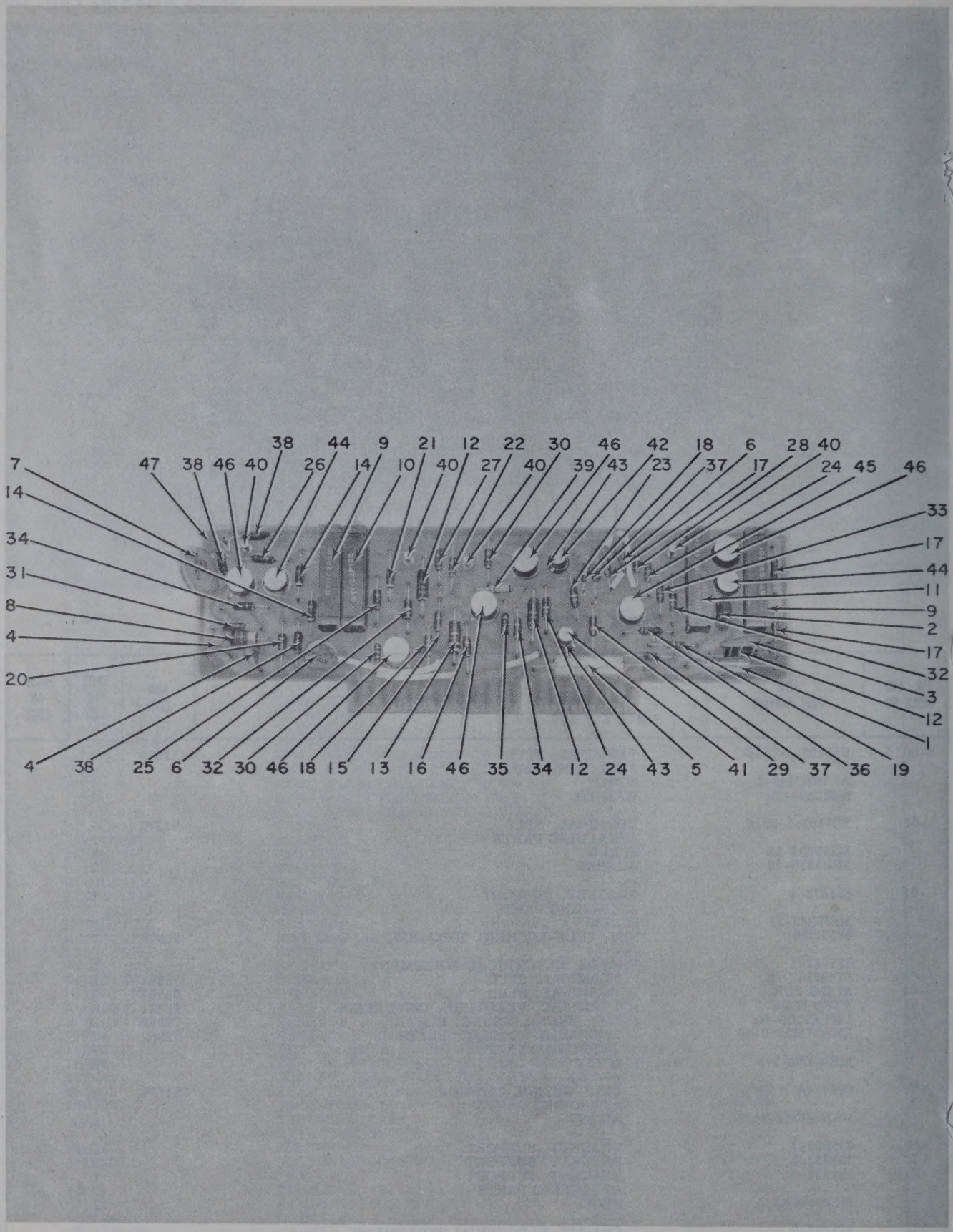

Figure 5. Automatic Gain Control Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
5-	316534-1	. AUTOMATIC GAIN CONTROL ASSEMBLY, See Fig. 1-60 for NHA		REF	
-1	CS13AE100K	. . CAPACITOR		1	
-2	CM05D331J03	. . CAPACITOR		1	
-3	CK63AW103M	. . CAPACITOR		1	
-4	CK60AW102M	. . CAPACITOR		2	
-5	316510-1	. . CAPACITOR, FIXED, PLASTIC DIELECTRIC, 0.047 µf, +12%, -5%, 100 wvdc		1	
-6	TGS25	. . CAPACITOR, FIXED, CERAMIC DIELECTRIC, 0.025 µf, +80%, -30%, 50 wvdc	56289	2	
-7	TGP10	. . CAPACITOR, FIXED, CERAMIC DIELECTRIC, 0.1 µf, +80%, -20%, 50 wvdc	56289	1	
-8	MS75008-42	. . COIL		1	
-9	RT11C2P501	. . RESISTOR		2	
-10	RT11C2P103	. . RESISTOR		1	
-11	RJ11BP105	. . RESISTOR		1	
-12	RC20GF561J	. . RESISTOR		3	
-13	RC20GF331J	. . RESISTOR		1	
-14	RC07GF911J	. . RESISTOR		2	
-15	RC07GF681J	. . RESISTOR		1	
-16	RC07GF622J	. . RESISTOR		1	
-17	RC07GF511J	. . RESISTOR		3	
-18	RC07GF474J	. . RESISTOR		2	
-19	RC07GF473J	. . RESISTOR		1	
-20	RC07GF471J	. . RESISTOR		1	
-21	RC07GF470J	. . RESISTOR		1	
-22	RC07GF332J	. . RESISTOR		1	
-23	RC07GF224J	. . RESISTOR		1	
-24	RC07GF223J	. . RESISTOR		2	
-25	RC07GF222J	. . RESISTOR		1	
-26	RC07GF153J	. . RESISTOR		1	
-27	RC07GF182J	. . RESISTOR		1	
-28	RC07GF395J	. . RESISTOR		1	
-29	RC07GF155J	. . RESISTOR		1	
-30	RC07GF152J	. . RESISTOR		2	
-31	RC07GF111J	. . RESISTOR		1	
-32	RC07GF104J	. . RESISTOR		2	
-33	RC07GF103J	. . RESISTOR		1	
-34	RC07GF102J	. . RESISTOR		2	
-35	316504-3	. . SEMICONDUCTOR DEVICE, DIODE, Silicon		1	
-36	316504-1	. . SEMICONDUCTOR DEVICE, DIODE, Silicon, Deleted.		1	
-36A	RC07GF103J	. . RESISTOR FIXED CARBON, 10K 1/4 w ± 5%	1	P1	S
-37	JAN1N914	. . SEMICONDUCTOR DEVICE		2	
-38	JAN1N483B	. . SEMICONDUCTOR DEVICE		3	
-39	JAN1N277M	. . SEMICONDUCTOR DEVICE		1	
-40	1558-2-05	. . TERMINAL, STUD	71279	4	
-41	316810-1	. . TRANSISTOR, Silicon		1	
-42	USN2N718A	. . TRANSISTOR		1	
-43	311193-1	. . RETAINER, TRANSISTOR		2	
-44	7136035	. . TRANSISTOR, Germanium, pnp		2	
-45	USN2N1132	. . TRANSISTOR		1	
-46	316815-1	. . TRANSISTOR, Silicon, npn		5	
-47	316259-1	. . PRINTED CIRCUIT BOARD		1	

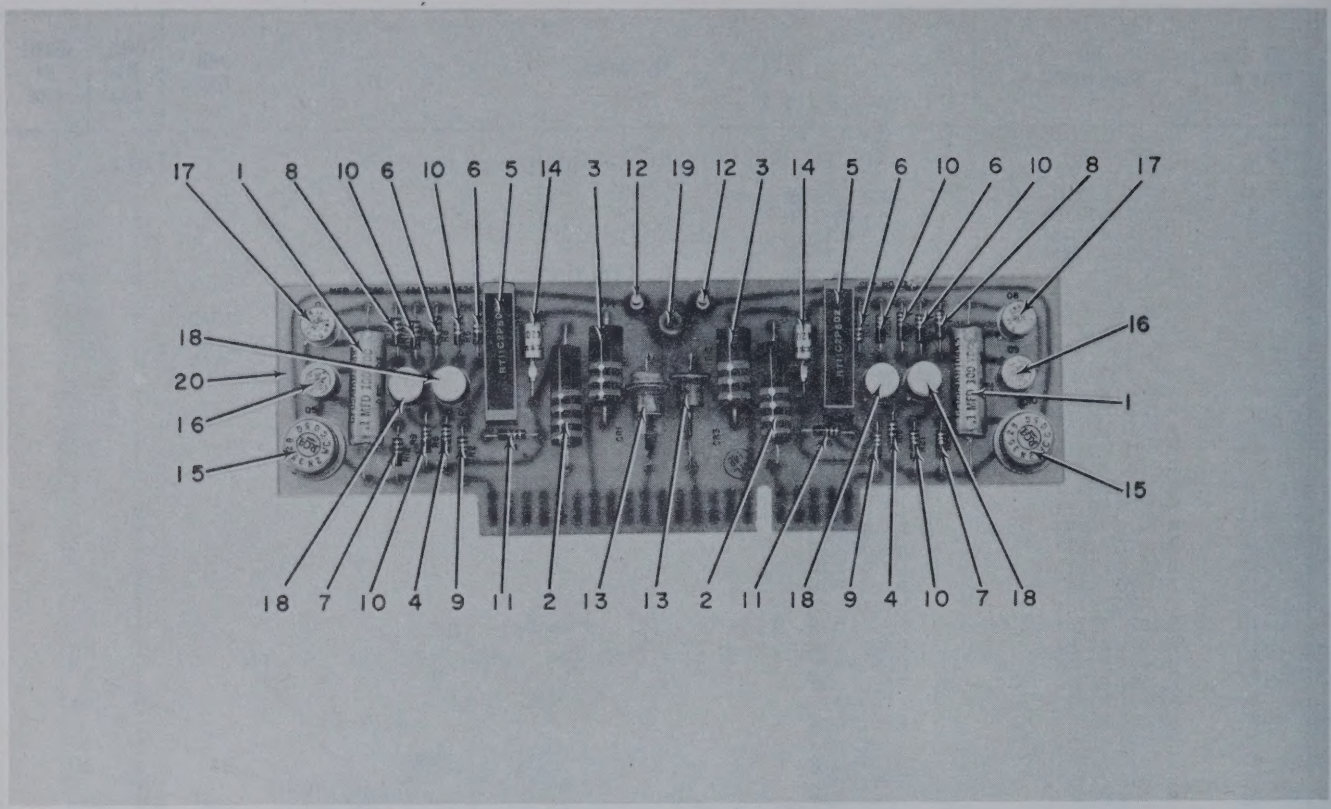

Figure 6. Heater Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
6-	316526-1	. HEATER ASSEMBLY, See Fig. 1-61 for NHA		REF	
-1	CP05A1KB104K	. . CAPACITOR		2	
-2	MS91189-37	. . COIL		2	
-3	RC42GF153J	. . RESISTOR		2	
-4	RC07GF512J	. . RESISTOR		2	
-5	RT11C2P502	. . RESISTOR		2	
-6	RC07GF472J	. . RESISTOR		4	
-7	RC07GF470J	. . RESISTOR		2	
-8	RC07GF391J	. . RESISTOR		2	
-9	RC07GF222J	. . RESISTOR		2	
-10	RC07GF103J	. . RESISTOR		6	
-11	RC07GF102J	. . RESISTOR		2	
-12	1558-2-05	. . TERMINAL, STUD	71279	2	
-13	JAN1N538	. . SEMICONDUCTOR DEVICE		2	
-14	JAN1N3023B	. . SEMICONDUCTOR DEVICE		2	
-15	316672-1	. . SEMICONDUCTOR DEVICE, Silicon, controlled-rectifier		2	
-16	227082-1	. . TRANSISTOR, Silicon, unijunction		2	
-17	USAF2N404	. . TRANSISTOR		2	
-18	316815-1	. . TRANSISTOR, Silicon, npn		4	
-19	1178-3	. . GROMMET, RUBBER	70485	1	
-20	316256-1	. . PRINTED CIRCUIT BOARD		1	

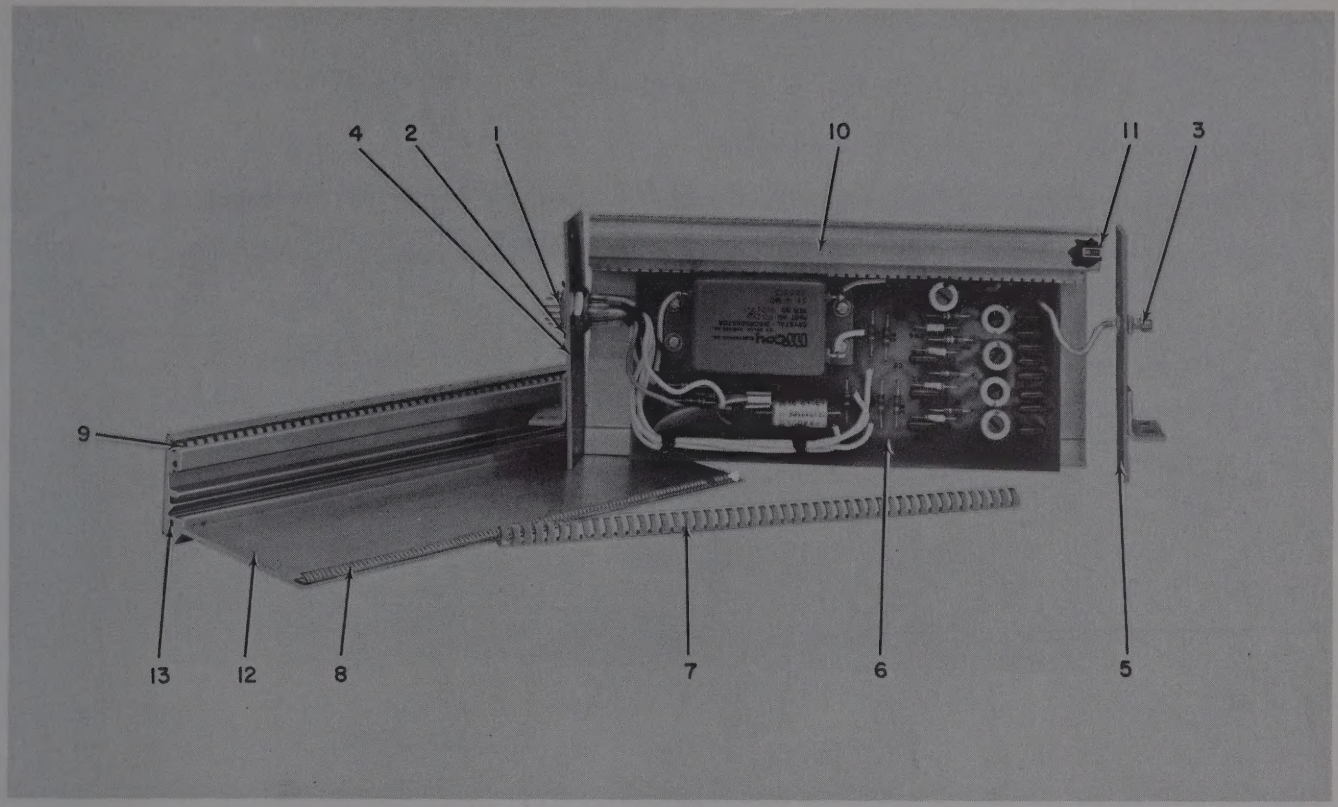

Figure 7. Discriminator Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
7-	316538-1	. DISCRIMINATOR ASSEMBLY, See Fig. 1-72 for NHA		REF	
-1	MS24056-2	. . CONNECTOR		1	
		ATTACHING PARTS			
	MS24017-2	. . NUT		1	
		---*---			
-2	MS24057-2	. . COUPLING		1	
-3	50-043-4401	. . CONNECTOR, RECEPTACLE, ELECTRICAL	98291	1	
-4	316393-1	. . COVER, DISCRIMINATOR, Left		1	
-5	316394-1	. . COVER, DISCRIMINATOR, Right		1	
		ATTACHING PARTS			
	MS35233-5	. . SCREW		8	
	MS35338-77	. . WASHER		8	
		---*---			
-6	316217-1	. . DISCRIMINATOR SUBASSEMBLY, See Fig. 8		1	
-7	97-390A6-1/2	. . TERMINAL STRIP, GROUNDING	30817	2	
-8	97-251A6-1/2	. . TERMINAL STRIP, GROUNDING	30817	1	
-9	97-380A6-1/2	. . TERMINAL STRIP, GROUNDING	30817	1	
-10	316590-2	. . FRAME, SUPPORT		1	
-11	HS08656-50	. . . INSERT, SCREW THREAD	73957	4	
-12	316537-1	. . FRAME, SUPPORT		1	
-13	HS08656-50	. . . INSERT, SCREW THREAD	73957	4	

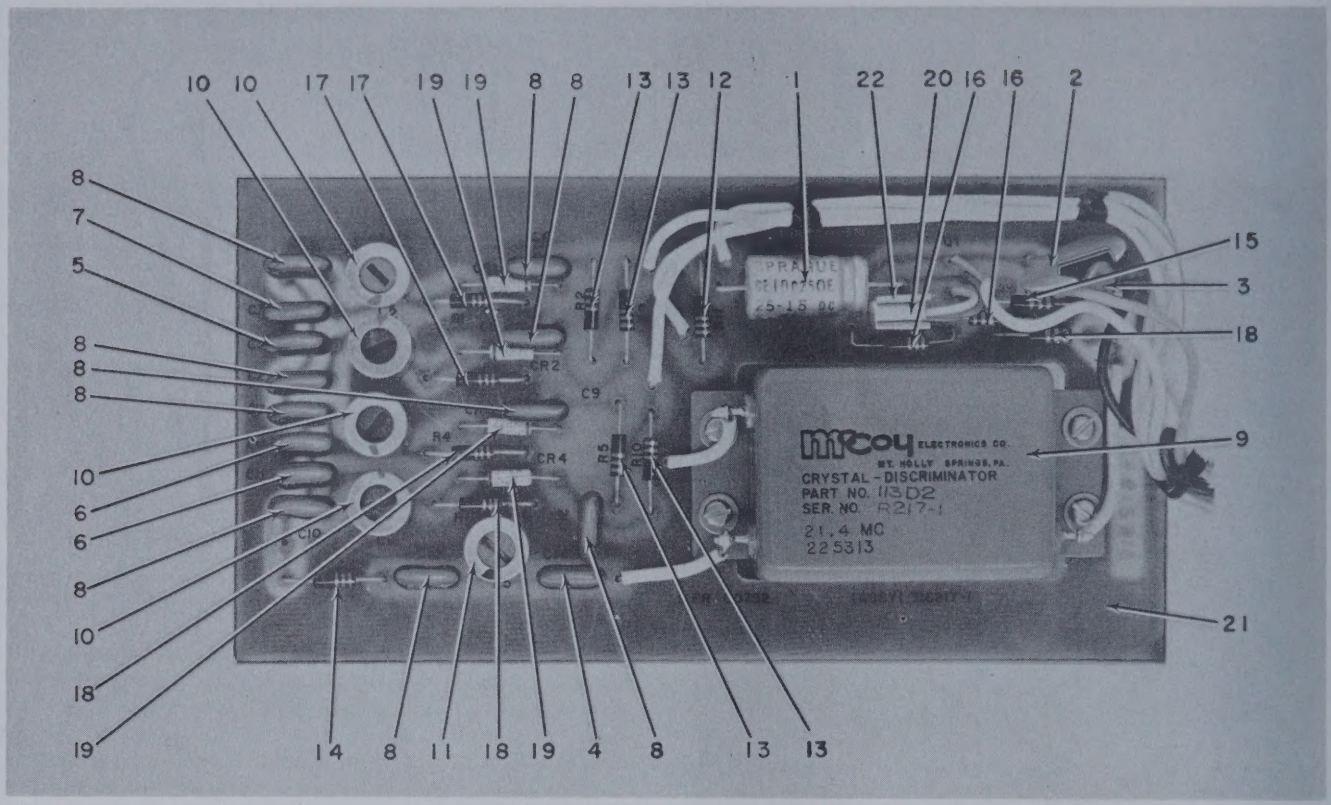

Figure 8. Discriminator Subassembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
8-	316217-1	. . DISCRIMINATOR SUBASSEMBLY, See Fig. 7-6 for NHA		REF	
-1	CE10C250E	. . . CAPACITOR		1	
-2	CK63AW103M	. . . CAPACITOR		1	
-3	CK60AW102M	. . . CAPACITOR		1	
-4	CM05C080K03	. . . CAPACITOR		1	
-5	CM05D390J03	. . . CAPACITOR		1	
-6	CM05D300J03	. . . CAPACITOR		2	
-7	CM05D240J03	. . . CAPACITOR		1	
-8	CM05C050K03	. . . CAPACITOR		9	
-9	225313-1	. . . DISCRIMINATOR, ELECTRICAL FREQUENCY, Crystal, 21.4 mc, 280 v		1	
		ATTACHING PARTS			
	MS35233-3	. . . SCREW		4	
	MS15795-802	. . . WASHER		4	
	MS35338-77	. . . WASHER		4	
	MS35649-24	. . . NUT		4	
		---*---			
-10	225789-5	. . . COIL, RADIO FREQUENCY, Variable, range 1.2 to 2.0 μh		4	
-11	225789-10	. . . COIL, RADIO FREQUENCY, Variable, range 4.9 to 8.0 μh		1	
-12	RC07GF682J	. . . RESISTOR		1	
-13	RC07GF512J	. . . RESISTOR		4	
-14	RC07GF511J	. . . RESISTOR		1	
-15	RC07GF332J	. . . RESISTOR		1	
-16	RC07GF223J	. . . RESISTOR		2	
-17	RC07GF222J	. . . RESISTOR		2	
-18	RC07GF104J	. . . RESISTOR		3	
-19	JAN1N277M	. . . SEMICONDUCTOR DEVICE		4	
-20	316671-1	. . . TRANSISTOR, Germanium, npn		1	
-21	316219-1	. . . PRINTED CIRCUIT BOARD		1	
-22	6186-1C	. . . . CLIP, SPRING TENSION	91506	1	
		ATTACHING PARTS			
	MS20470A3-2	. . . . RIVET		1	
		---*---			

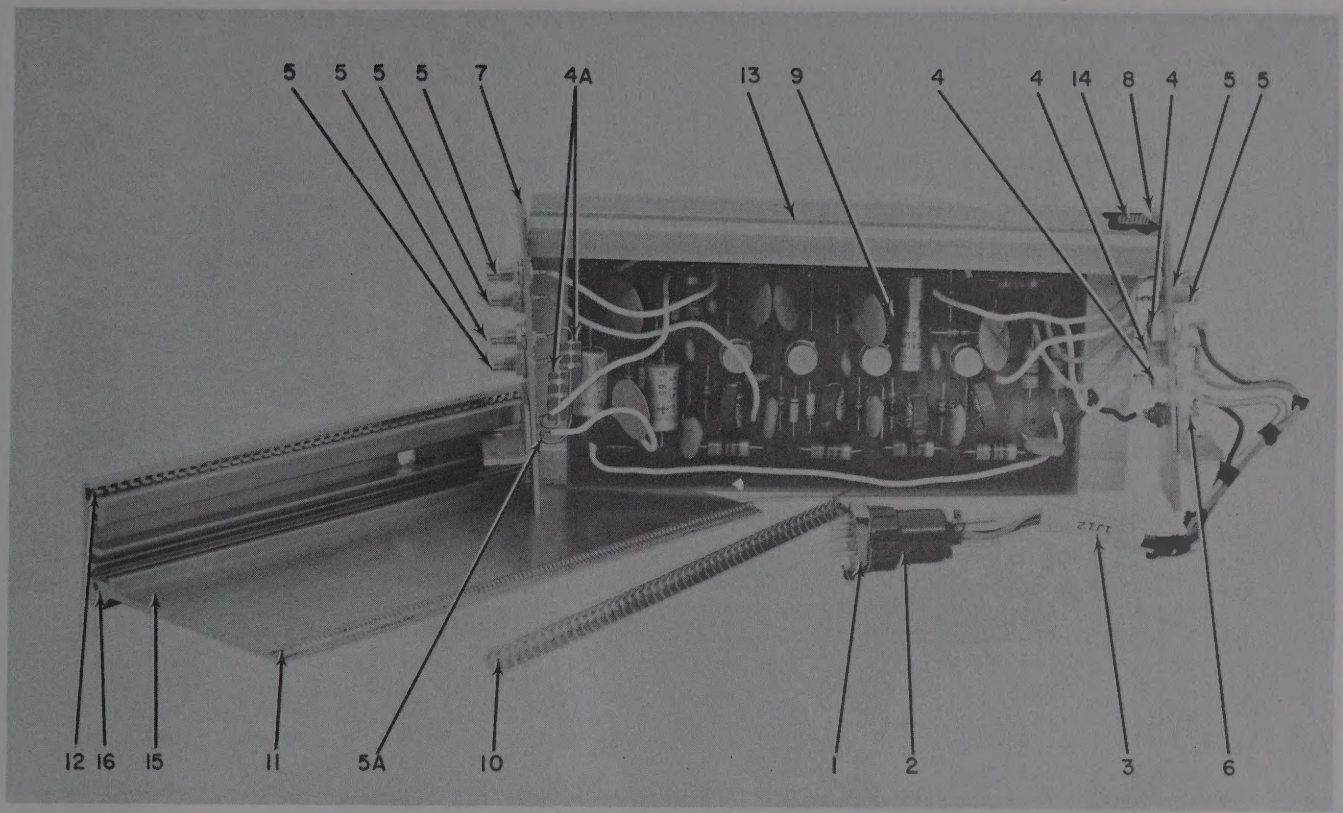

Figure 9. Limiter Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
9-	316547-1	. LIMITER ASSEMBLY, See Fig. 1-75 for NHA		REF	
-1	MS24056-2	. . CONNECTOR		1	
-2	MS24018-6	. . HOOD		1	
-3	317154-18	. . SLEEVE, MARKER, CABLE		1	
-4	148325-34	. . CAPACITOR, FIXED, CERAMIC DIELECTRIC, 1000 μμf, 20%, 500 wvdc		3	
-4A	MS75008-42	. . COIL		2	
-5	50-043-4401	. . CONNECTOR, RECEPTACLE, ELECTRICAL	98291	6	
-5A	1481B	. . TERMINAL, STUD	15849	2	
		ATTACHING PARTS			
	MS35233-2	. . SCREW		2	
		---*---			
-6	333	. . TERMINAL, LUG	79963	2	
		ATTACHING PARTS			
	MS35233-15	. . SCREW		1	
	50FM440	. . NUT, SELF-LOCKING, HEXAGON, No. 4-40 thd	56878	1	
		---*---			
-7	316390-1	. . COVER, LIMITER, Left		1	
-8	316389-1	. . COVER, LIMITER, Right		1	
		ATTACHING PARTS			
	MS35233-5	. . SCREW		8	
	MS35338-77	. . WASHER		8	
		---*---			
-9	316426-1	. . LIMITER SUBASSEMBLY, See Fig. 10		1	
-10	97-390A6-1/2	. . TERMINAL STRIP, GROUNDING	30817	2	
-11	97-251A6-1/2	. . TERMINAL STRIP, GROUNDING	30817	1	
-12	97-380A6-1/2	. . TERMINAL STRIP, GROUNDING	30817	1	
-13	316590-5	. . FRAME, SUPPORT		1	
-14	HS08656-50	. . . INSERT, SCREW THREAD	73957	4	
-15	316546-1	. . FRAME, SUPPORT		1	
-16	HS08656-50	. . . INSERT, SCREW THREAD	73957	4	

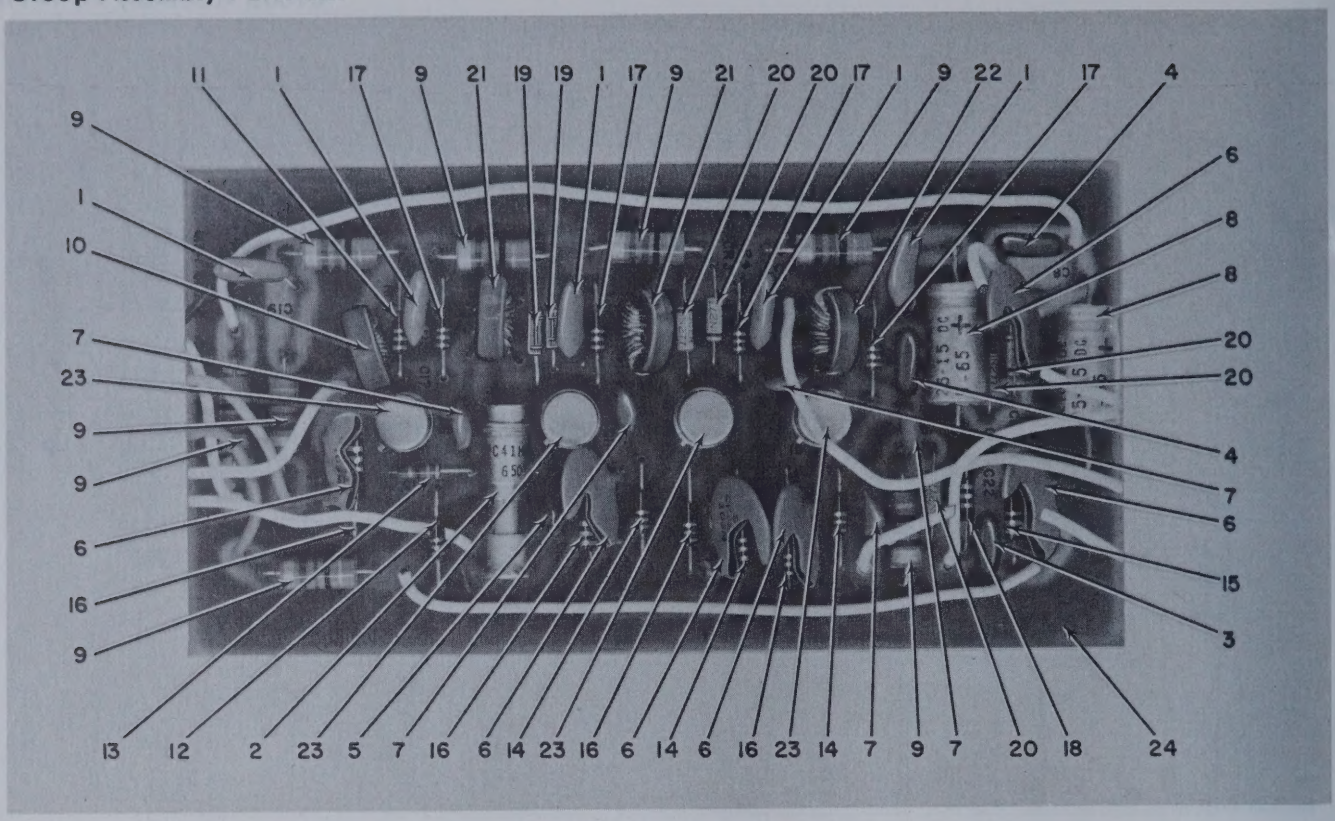

Figure 10. Limiter Subassembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
10-	316426-1	. . LIMITER SUBASSEMBLY, See Fig. 9-9 for NHA		REF	
-1	TGS50	. . . CAPACITOR, FIXED, CERAMIC DIELECTRIC, 0.05 μf, +80%, -20%, 50 wvdc	56289	5	
-2	PC41H180	. . . CAPACITOR		1	
-3	CM05D470J03	. . . CAPACITOR		1	
-4	CM05D390J03	. . . CAPACITOR		2	
-5	CM05D200J03	. . . CAPACITOR		1	
-6	CK63AW103M	. . . CAPACITOR		6	
-7	CK60AW102M	. . . CAPACITOR		5	
-8	CE10C250E	. . . CAPACITOR		2	
-9	MS75008-42	. . . COIL		8	
-10	317204-1	. . . COIL, RADIO FREQUENCY, 0.7 μh		1	
-11	RC07GF681J	. . . RESISTOR		1	
-12	RC07GF362J	. . . RESISTOR		1	
-13	RC07GF330J	. . . RESISTOR		1	
-14	RC07GF302J	. . . RESISTOR		3	
-15	RC07GF224J	. . . RESISTOR		1	
-16	RC07GF221J	. . . RESISTOR		4	
-17	RC07GF103J	. . . RESISTOR		4	
-18	RC07GF102J	. . . RESISTOR		1	
-19	JAN1N914	. . . SEMICONDUCTOR DEVICE		2	
-20	JAN1N277M	. . . SEMICONDUCTOR DEVICE		5	
-21	317203-1	. . . TRANSFORMER, RADIO FREQUENCY, 0.15 to 0.70 μh		2	
-22	317206-1	. . . TRANSFORMER, RADIO FREQUENCY, 0.09 to 0.59 μh		1	
-23	316815-1	. . . TRANSISTOR, Silicon, npn		4	
-24	316255-1	. . . PRINTED CIRCUIT BOARD		1	

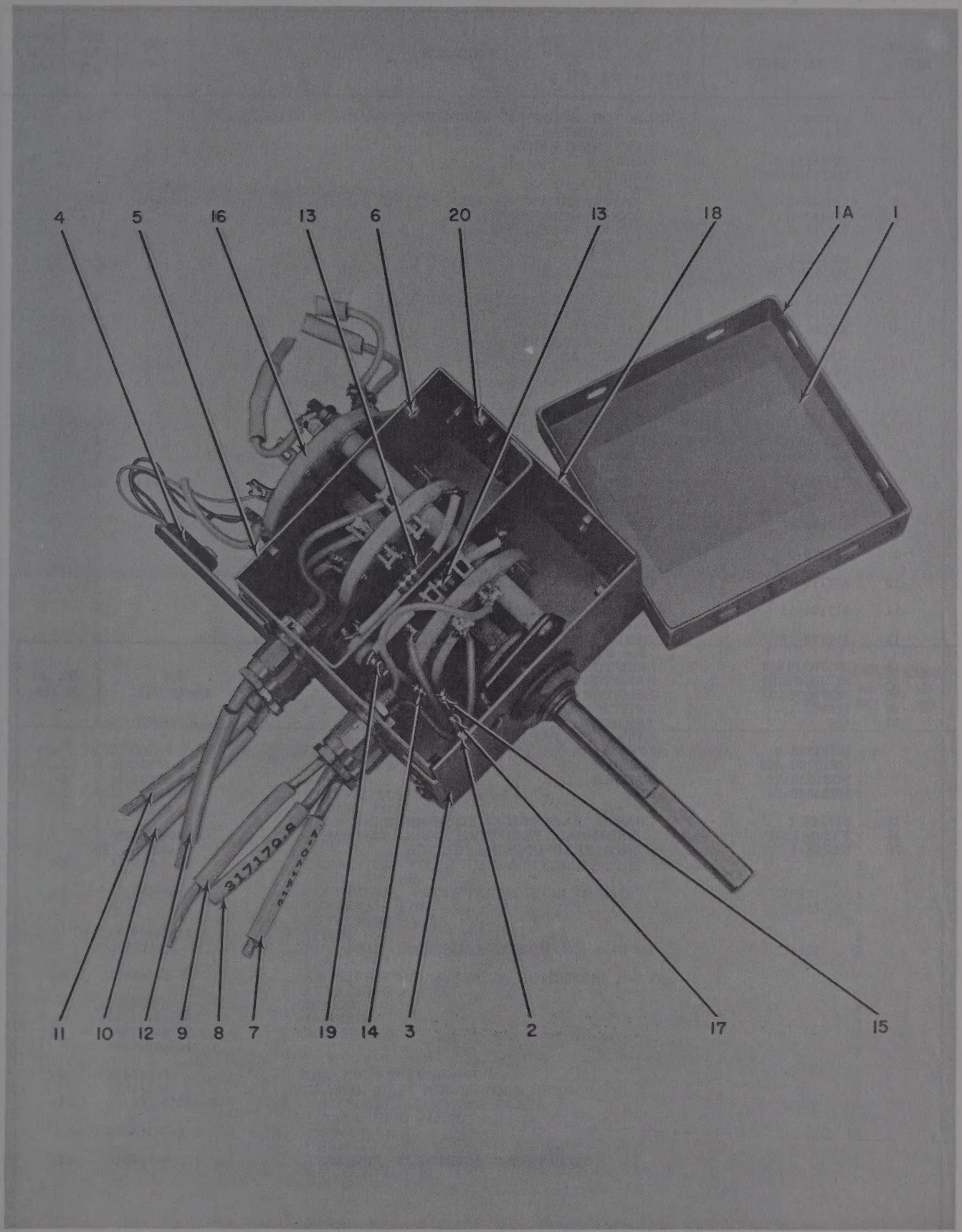

Figure 11. Bandwidth Selector Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
11-	316166-1	. SELECTOR ASSEMBLY, BANDWIDTH, See Fig. 1-80 for NHA		REF	
	316198-1	. . COVER ASSEMBLY, SELECTOR		1	
		ATTACHING PARTS			
	MS35233-3	. . SCREW		8	
	MS15795-802	. . WASHER		8	
		---*---			
-1	223023-1	. . . INSULATION TAPE, ELECTRICAL		AR	
-1A	316198-6	. . . COVER, SELECTOR		1	
	316185-1	. . BRACKET, SUPPORT, Left		1	
		ATTACHING PARTS			
	MS35233-3	. . SCREW		6	
	MS15795-802	. . WASHER		6	
		---*---			
-2	UL256-1	. . . NUT, SELF-LOCKING, CLINCH	46384	2	
-3	316185-6	. . . BRACKET, SUPPORT		1	
-4	RT22C2L500	. . RESISTOR		1	
		ATTACHING PARTS			
	MS35233-5	. . SCREW		2	
	MS15795-802	. . WASHER		2	
	50FM256	. . NUT, SELF-LOCKING, HEXAGON, No. 2-56 thd	56878	2	
		---*---			
-5	316254-1	. . BRACKET, SUPPORT, Right		1	
		ATTACHING PARTS			
	MS35233-3	. . SCREW		6	
	MS15795-802	. . WASHER		6	
		---*---			
-6	UL256-1	. . . NUT, SELF-LOCKING, CLINCH	46384	2	
-7	317179-7	. . CABLE ASSEMBLY, RADIO FREQUENCY, 7-3/8 inches, See Fig. 27		1	
-8	317179-8	. . CABLE ASSEMBLY, RADIO FREQUENCY, 4-5/8 inches, See Fig. 30		1	
-9	317179-9	. . CABLE ASSEMBLY, RADIO FREQUENCY, 4 inches, See Fig. 30		1	
-10	317179-10	. . CABLE ASSEMBLY, RADIO FREQUENCY, 3 inches, See Fig. 27		1	
-11	317179-11	. . CABLE ASSEMBLY, RADIO FREQUENCY, 2-3/4 inches, See Fig. 30		1	
-12	317179-12	. . CABLE ASSEMBLY, RADIO FREQUENCY, 2-1/2 inches, See Fig. 30		1	
-13	RC07GF180J	. . RESISTOR		2	
-14	RC07GF620J	. . RESISTOR		1	
-15	RC07GF510J	. . RESISTOR		1	
-16	226957-1	. . SWITCH, ROTARY		1	
-17	426	. . TERMINAL, LUG	79963	2	
		ATTACHING PARTS			
	MS35233-2	. . SCREW		2	
	MS15795-802	. . WASHER		2	
	MS35338-77	. . WASHER		2	
	MS35649-24	. . NUT		2	
		---*---			
-18	316244-1	. . CHASSIS, ELECTRICAL EQUIPMENT		1	
-19	FTSM4TUR	. . . TERMINAL, FEEDTHRU, INSULATED	98291	1	
-20	UL256-1	. . . NUT, SELF-LOCKING, CLINCH	46384	20	

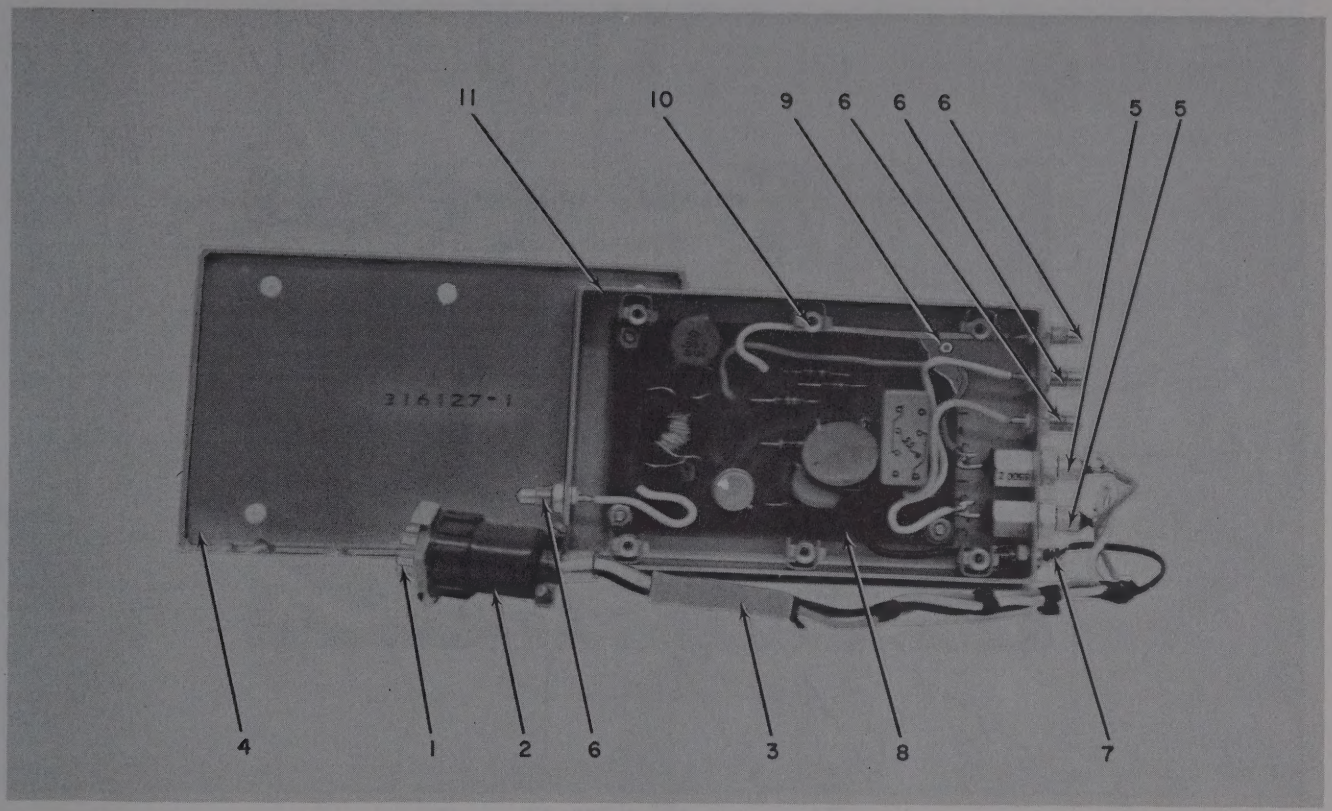

Figure 12. Combining Amplifier Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
12-	316123-1	. AMPLIFIER ASSEMBLY, COMBINING, See Fig. 1-81 for NHA		REF	
-1	MS24056-2	. . CONNECTOR		1	
-2	MS24018-6	. . HOOD		1	
-3	317154-10	. . SLEEVE, MARKER, CABLE		1	
-4	316127-1	. . COVER, AMPLIFIER		1	
		ATTACHING PARTS			
	MS35233-14	. . SCREW		3	
		---*---			
-5	316617-1	. . CAPACITOR, FIXED, CERAMIC DIELECTRIC, 8500 $\mu\mu$f, GMV, 500 wvdc		2	
-6	50-043-4401	. . CONNECTOR, RECEPTACLE, ELECTRICAL	98291	4	
-7	333	. . TERMINAL, LUG	79963	2	
		ATTACHING PARTS			
	MS35233-13	. . SCREW		1	
	50FM440	. . NUT, SELF-LOCKING, HEXAGON, No. 4-40 thd	56878	1	
		---*---			
-8	316467-1	. . AMPLIFIER SUBASSEMBLY, COMBINING, See Fig. 13		1	
		ATTACHING PARTS			
	MS35233-5	. . SCREW		4	
	MS15795-802	. . WASHER		4	
	MS35338-77	. . WASHER		4	
	MS35649-24	. . NUT		4	
		---*---			
-9	316131-1	. . SPACER, SLEEVE		4	
	316116-1	. . CHASSIS, ELECTRICAL EQUIPMENT		1	
-10	LHA27M2860-40	. . . NUT, SELF-LOCKING, PLATE	72962	6	
		ATTACHING PARTS			
	MS20470A2-3	. . . RIVET		12	
		---*---			
-11	316116-6	. . . CHASSIS, ELECTRICAL EQUIPMENT		1	

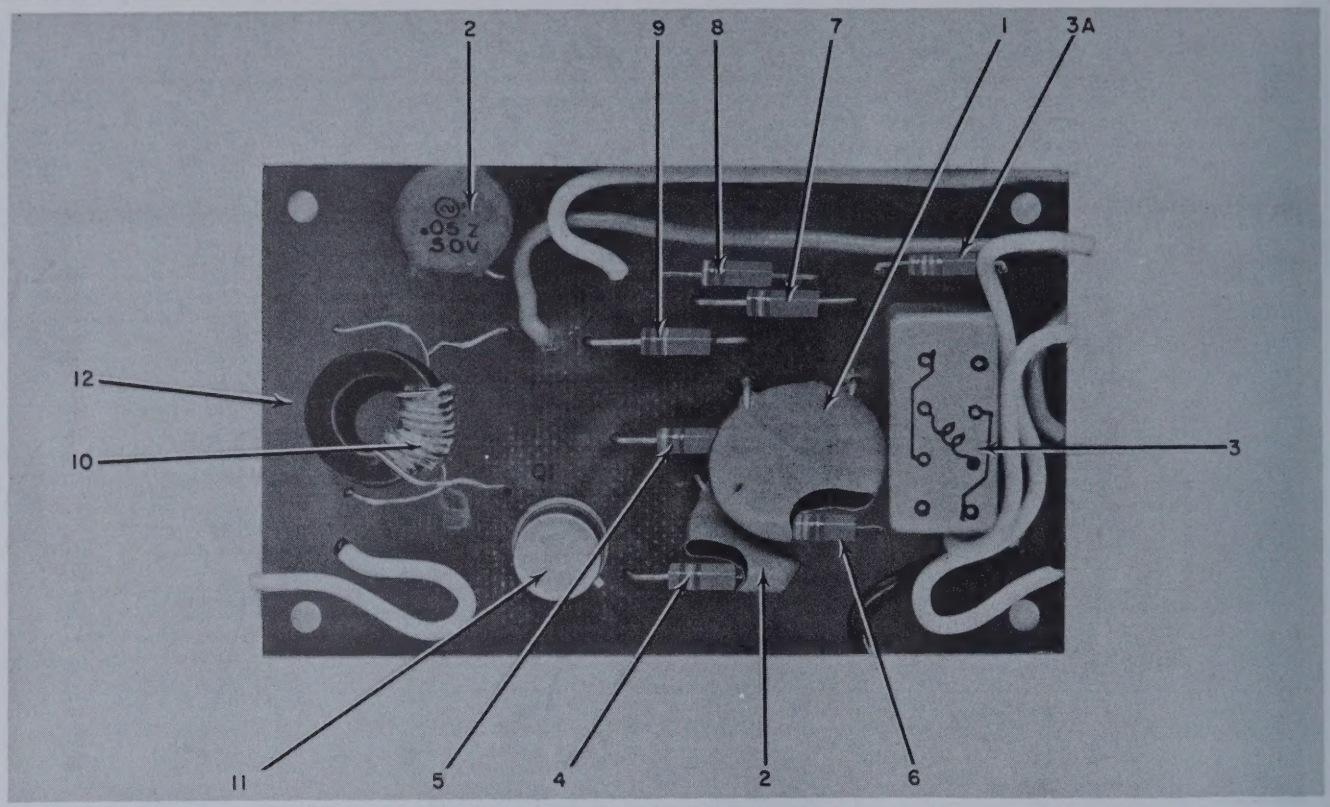

Figure 13. Combining Amplifier Subassembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
13-	316467-1	. . AMPLIFIER SUBASSEMBLY, COMBINING, See Fig. 12-8 for NHA		REF	
-1	CK63AW103M	. . . CAPACITOR		1	
-2	TGS50	. . . CAPACITOR, FIXED, CERAMIC DIELECTRIC, 0.05 µf, +80%, -20%, 50 wvdc	56289	2	
-3	316631-1	. . . RELAY, ARMATURE		1	
-3A	RC07GF470J	. . . RESISTOR		1	
-4	RC07GF510J	. . . RESISTOR		1	
-5	RC07GF302J	. . . RESISTOR		1	
-6	RC07GF221J	. . . RESISTOR		1	
-7	RC07GF201J	. . . RESISTOR		1	
-8	RC07GF110J	. . . RESISTOR		1	
-9	RC07GF103J	. . . RESISTOR		1	
-10	317203-1	. . . TRANSFORMER, RADIO FREQUENCY, 0.7 to 0.15 µh		1	
-11	316815-1	. . . TRANSISTOR, Silicon, npn		1	
-12	316250-1	. . . PRINTED CIRCUIT BOARD		1	

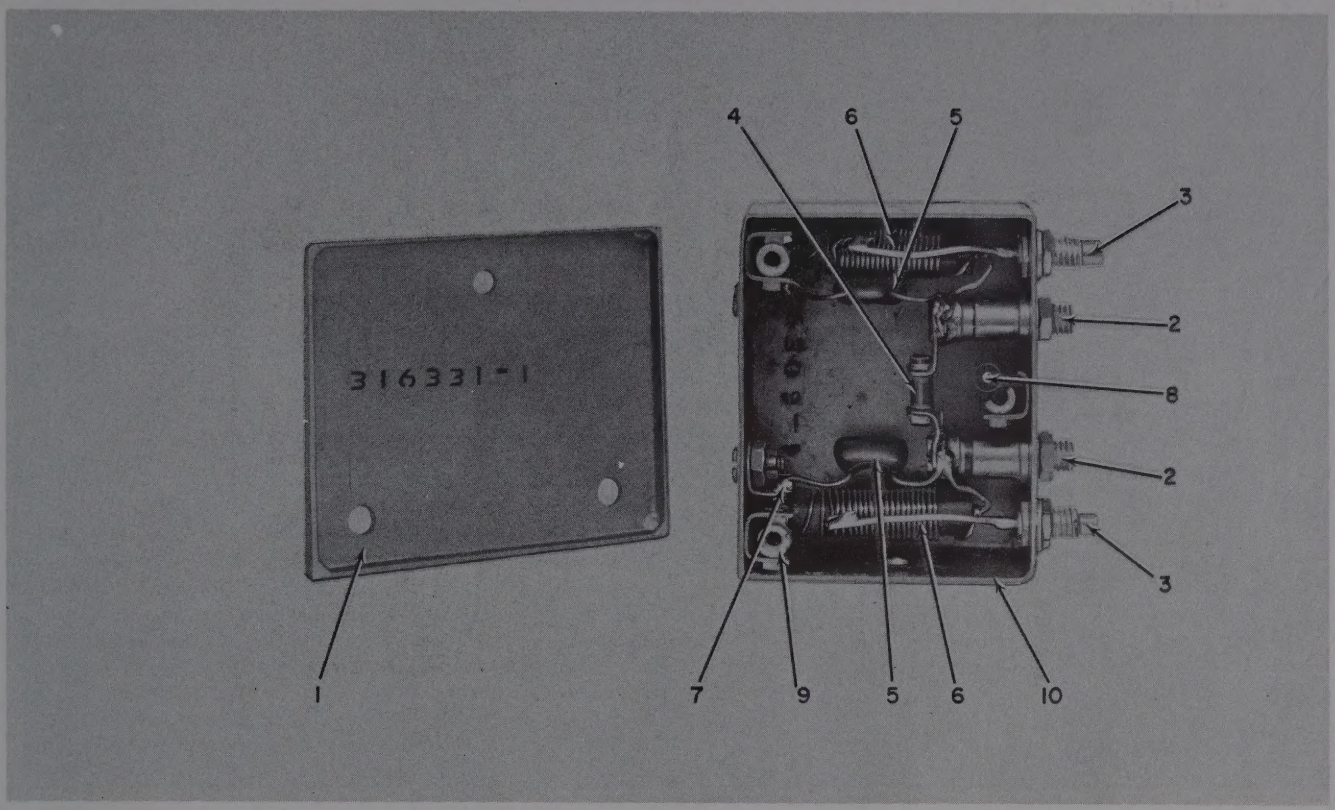

Figure 14. 500-Kc Filter Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
14-	316168-1	. FILTER ASSEMBLY, 500-KC, See Fig. 1-83 for NHA		REF	
-1	316331-1	. . COVER, FILTER		1	
		ATTACHING PARTS			
	MS35233-14	. . SCREW		3	
		---*---			
-2	PC40J8R5	. . CAPACITOR		2	
-3	50-043-4401	. . CONNECTOR, RECEPTACLE, ELECTRICAL	98291	2	
-4	CC20SK0R5C	. . CAPACITOR		1	
-5	CM05D470J03	. . CAPACITOR		2	
-6	317201-1	. . TRANSFORMER, RADIO FREQUENCY, 1.1 μh		2	
-7	426	. . TERMINAL, LUG	79963	2	
		ATTACHING PARTS			
	MS35233-3	. . SCREW		2	
	50FM256	. . NUT, SELF-LOCKING, HEXAGON, No. 2-56 thd	56878	2	
		---*---			
	316309-1	. . CHASSIS, ELECTRICAL, EQUIPMENT		1	
-8	UL256-1	. . . NUT, SELF-LOCKING, CLINCH	46384	3	
-9	LHA27M2860-40	. . . NUT, SELF-LOCKING, PLATE	72962	3	
		ATTACHING PARTS			
	MS20470AD2-3	. . . RIVET		6	
		---*---			
-10	316309-6	. . . CHASSIS, ELECTRICAL EQUIPMENT		1	

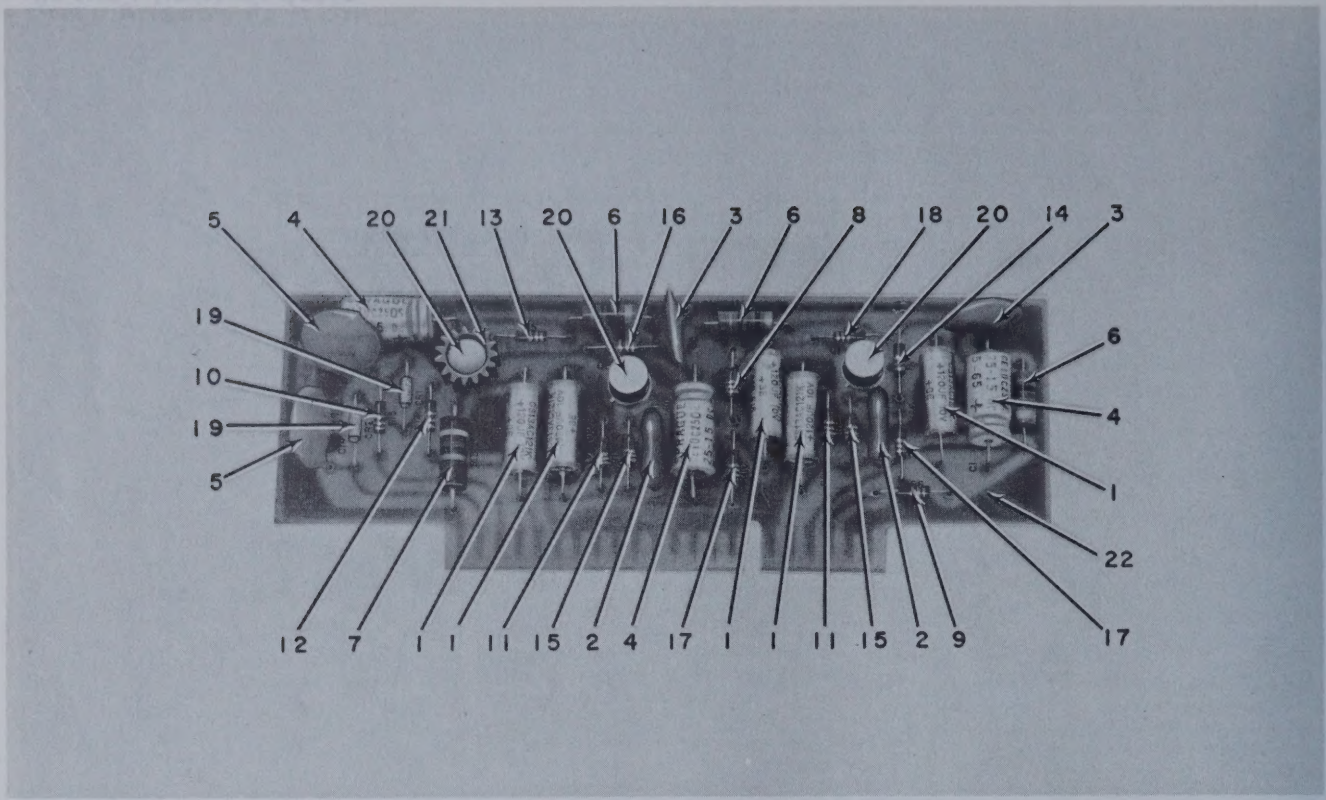

Figure 15. Video Amplifier Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
15-	316438-1	. AMPLIFIER ASSEMBLY, VIDEO, See Fig. 1-85 for NHA		REF	
-1	CS13AC121K	. . CAPACITOR		5	
-2	CM06D152J03	. . CAPACITOR		2	
-3	CK63AW103M	. . CAPACITOR		2	
-4	CE10C250E	. . CAPACITOR		3	
-5	TGP10	. . CAPACITOR, FIXED, CERAMIC DIELECTRIC, 0.1 µf, +80%, -20%, 50 wvdc	56289	2	
-6	MS75008-42	. . COIL		3	
-7	RC32GF241J	. . RESISTOR		1	
-8	RC07GF203J	. . RESISTOR		1	
-9	RC07GF681J	. . RESISTOR		1	
-10	RC07GF562J	. . RESISTOR		1	
-11	RC07GF561J	. . RESISTOR		2	
-12	RC07GF510J	. . RESISTOR		1	
-13	RC07GF470J	. . RESISTOR		1	
-14	RC07GF223J	. . RESISTOR		1	
-15	RC07GF121J	. . RESISTOR		2	
-16	RC07GF112J	. . RESISTOR		1	
-17	RC07GF103J	. . RESISTOR		2	
-18	RC07GF102J	. . RESISTOR		1	
-19	JAN1N277M	. . SEMICONDUCTOR DEVICE		2	
-20	316815-1	. . TRANSISTOR, Silicon, npn		3	
-21	3AL635-2R	. . HEAT SINK, ELECTRICAL-ELECTRONIC COMPONENT	07387	1	
-22	316249-1	. . PRINTED CIRCUIT BOARD		1	

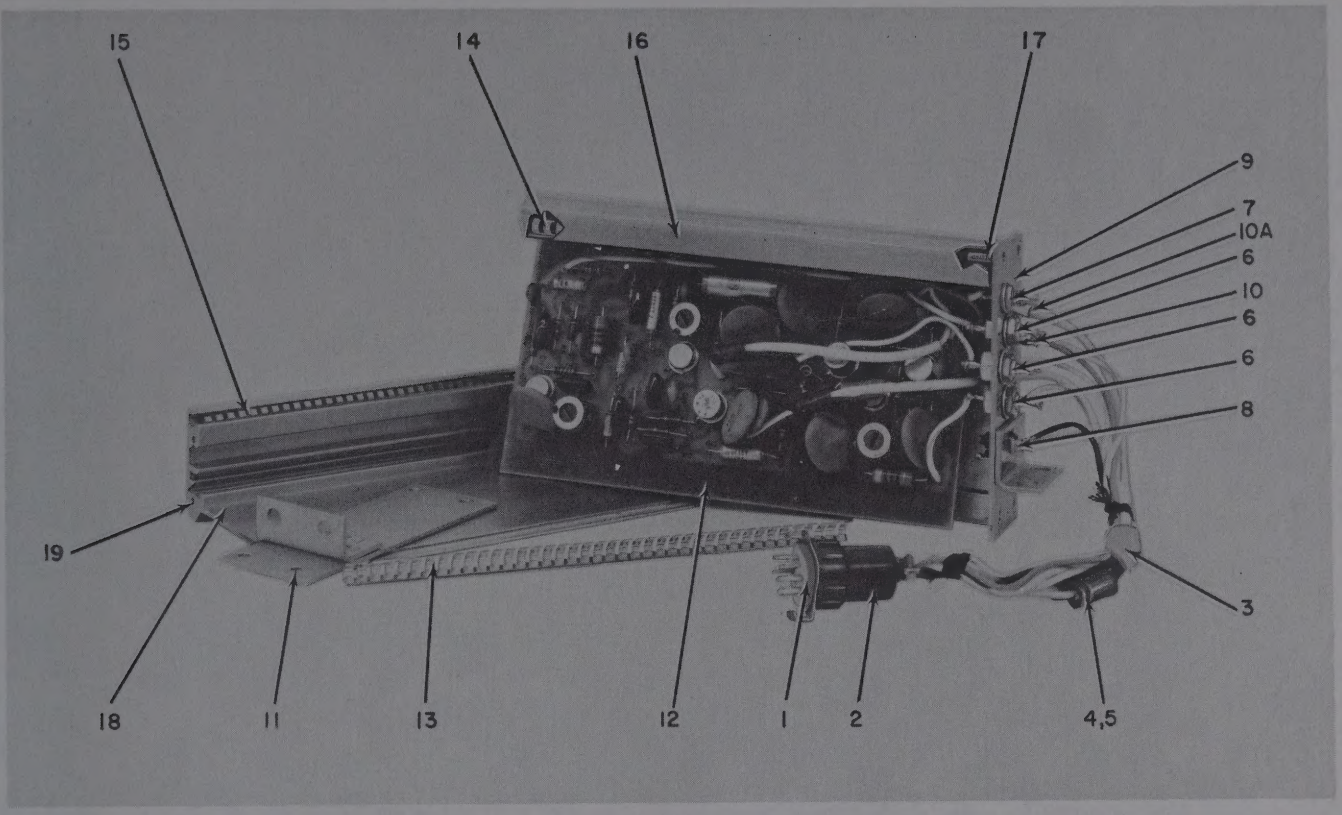

Figure 16. Beat-Frequency Oscillator Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
16-	316514-1	. BEAT-FREQUENCY OSCILLATOR ASSEMBLY, See Fig. 1-88 for NHA		REF	
-1	MS24056-2	. . CONNECTOR		1	
-2	MS24018-6	. . HOOD		1	
-3	317154-9	. . SLEEVE, MARKER, CABLE		1	
-4	Y0E90	. . FERRULE, RADIO FREQUENCY,CABLE, GROUNDING, Outer	09922	2	
-5	GSB071	. . FERRULE, RADIO FREQUENCY CABLE, GROUNDING, Inner	59730	2	
-6	148325-34	. . CAPACITOR, FIXED, CERAMIC DIELECTRIC, 1000 μμf, 20%, 500 wvdc		3	
-7	50-043-4401	. . CONNECTOR, RECEPTACLE, ELECTRICAL	98291	1	
-8	333	. . TERMINAL, LUG	79963	2	
		ATTACHING PARTS			
	MS35233-15	. . SCREW		1	
	50FM440	. . NUT, SELF-LOCKING, HEXAGON, No. 4-40 thd	56878	1	
		---*---			
-9	316391-1	. . COVER, OSCILLATOR, Left		1	
-10	FTSM4TUR	. . . TERMINAL, FEEDTHRU, INSULATED	98291	1	
-10A	SB250	. . . BUSHING, ELECTRICAL CONDUCTOR	28520	2	
-11	316392-1	. . COVER, OSCILLATOR, Right		1	
		ATTACHING PARTS			
	MS35233-5	. . SCREW		8	
	MS35338-77	. . WASHER		8	
		---*---			
-12	316484-1	. . BEAT-FREQUENCY OSCILLATOR SUBASSEMBLY, See Fig. 17		1	
-13	97-390A5-3/8	. . TERMINAL STRIP, GROUNDING	30817	2	
-14	97-251A5-3/8	. . TERMINAL STRIP, GROUNDING	30817	1	
-15	97-380A5-3/8	. . TERMINAL STRIP, GROUNDING	30817	1	
-16	316590-1	. . FRAME, SUPPORT		1	
-17	HS08656-50	. . . INSERT, SCREW THREAD	73957	4	
-18	316515-1	. . FRAME, SUPPORT		1	
-19	HS08656-50	. . . INSERT, SCREW THREAD	73957	4	

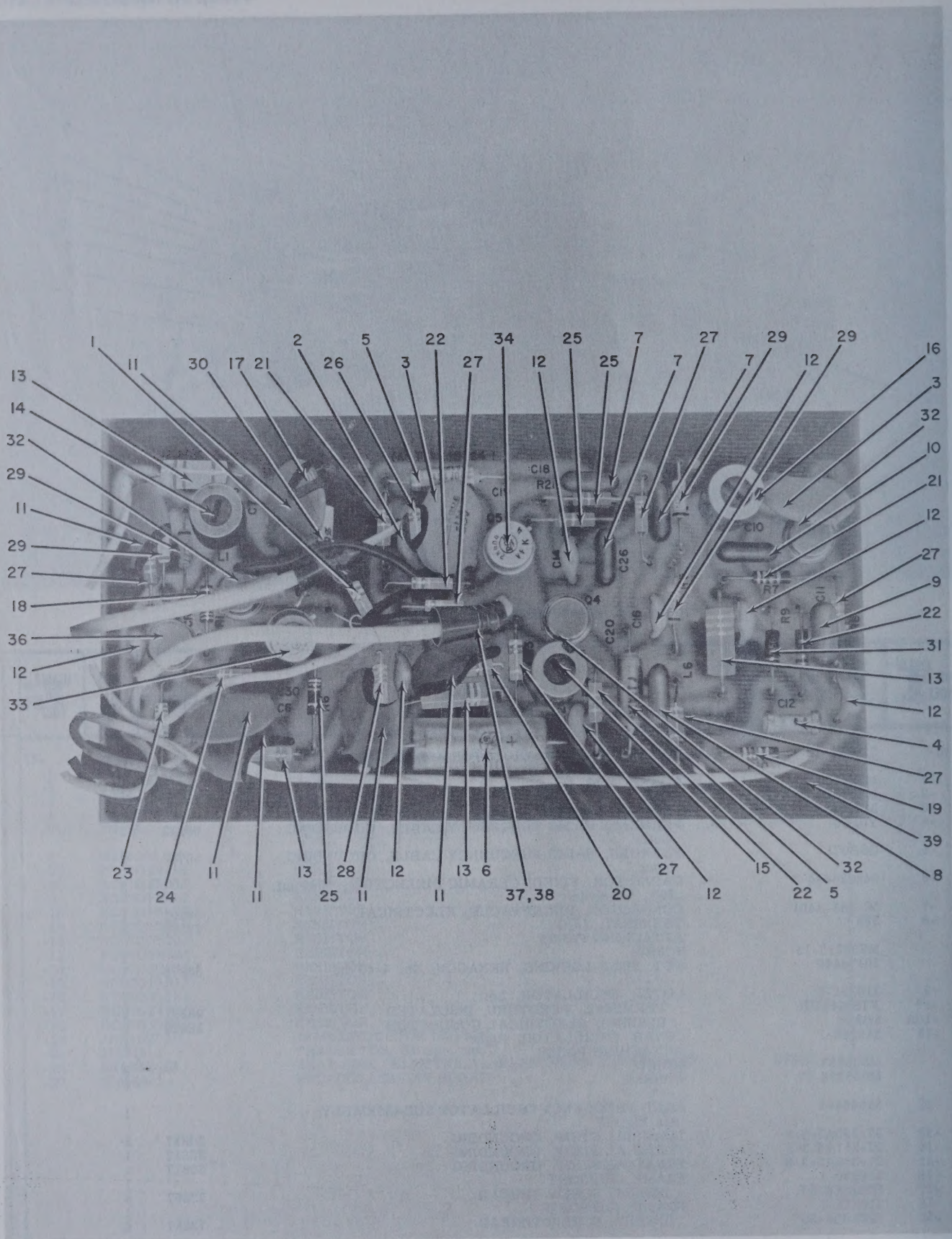

Figure 17. Beat-Frequency Oscillator Subassembly

CROSS-REFERENCE INDEX

NOTE: The circuit diagrams of Chapter 6 are listed in the List of Illustrations.
(Prefix each Reference Number with the Chapter Number denoted by the Column.)
(KEY: Numbers preceded by "f" are illustrations; "t" are tables; others are paragraphs.)

OFFICIAL NOMENCLATURE Common Name	Chapter 2 Installation	Chapter 3 Operation	Chapter 4 Principles of Operation	Chapter 5	
				Org/Field Maintenance	Alignment
AGC Amplifier			f4, 55	f8	16, 26
Band A Tuner			26, 59	f12, f13	22, 23,
Band B Tuner			30, 59		24, 25,
Bandwidth Selector			37	t3	
Beat Frequency Oscillator			44	f7	15, 28
Combining Amplifier			34	t4	
Cor/Audio Amplifier			51	t7	29
Discriminator			42	f4	13
Heater Control			f2, 22		19
I-F Amplifier			38	f2, f3, f10 f11, f14	12, 20
Limiter			39	t5	
Local Oscillator Output Unit			33	t2	
Power Supply			f1, 18	18	
RADIO RECEIVER R-1283/GRC Receiver	f1, 13	3, 4, 5	f3, 2 through 16		17
Video Amplifier			49	t6	
500-Kc Filter			45	f5, f6	14

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Discriminator	5-13
I-F Amplifier	5-12
500-Kc Filter	5-14
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Band B Tuner Alignment	5-24
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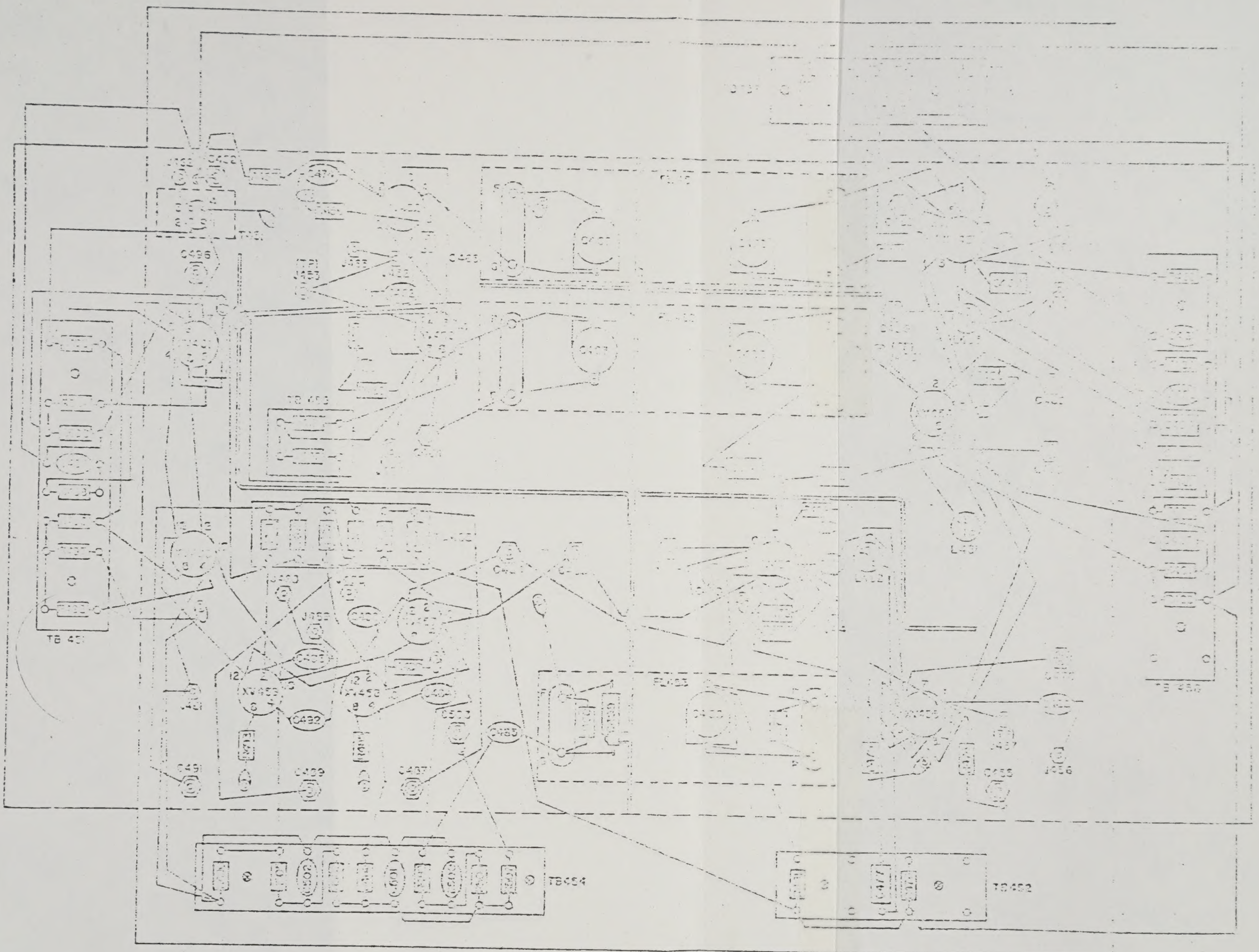


Figure 6-75. First I-F and Injection Amplifier, Wiring Diagram

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
17-	316484-1	. . BEAT-FREQUENCY OSCILLATOR SUBASSEMBLY, See Fig. 16-12 for NHA		REF	
-1	227125-1	. . . CAPACITOR, FIXED, PLASTIC DIELECTRIC, 0.047 µf, 10%, 100 wvdc		1	
-2	TGS50	. . . CAPACITOR, FIXED, CERAMIC DIELECTRIC, 0.05 µf, +80%, -20%, 50 wvdc	56289	1	
-3	TGP10	. . . CAPACITOR, FIXED, CERAMIC DIELECTRIC, 0.1 µf, +80%, -20%, 50 wvdc	56289	2	
-4	CC20SK010D	. . . CAPACITOR		1	
-5	CS13AD220K	. . . CAPACITOR		2	
-6	CS13AD151K	. . . CAPACITOR		1	
-7	CM05C050K03	. . . CAPACITOR		3	
-8	CM05D200J03	. . . CAPACITOR		1	
-9	CM05D331J03	. . . CAPACITOR		1	
-10	CM05D390J03	. . . CAPACITOR		1	
-11	CK63AW103M	. . . CAPACITOR		6	
-12	CK60AW102M	. . . CAPACITOR		7	
-13	MS75008-42	. . . COIL		4	
-14	225789-5	. . . COIL, RADIO FREQUENCY, Variable, range 1.2 to 2.0 µh		1	
-15	225789-7	. . . COIL, RADIO FREQUENCY, Variable, range 2.2 to 3.6 µh		1	
-16	225789-10	. . . COIL, RADIO FREQUENCY, Variable, range 4.9 to 8.0 µh		1	
-17	RC07GF680J	. . . RESISTOR		1	
-18	RC07GF511J	. . . RESISTOR		1	
-19	RC07GF474J	. . . RESISTOR		1	
-20	RC07GF470J	. . . RESISTOR		1	
-21	RC07GF333J	. . . RESISTOR		2	
-22	RC07GF332J	. . . RESISTOR		3	
-23	RC07GF302J	. . . RESISTOR		1	
-24	RC07GF221J	. . . RESISTOR		1	
-25	RC07GF152J	. . . RESISTOR		3	
-26	RC07GF104J	. . . RESISTOR		1	
-27	RC07GF103J	. . . RESISTOR		6	
-28	RC07GF102J	. . . RESISTOR		1	
-29	JAN1N277M	. . . SEMICONDUCTOR DEVICE		4	
-30	JAN1N914	. . . SEMICONDUCTOR DEVICE		1	
-31	226942-1	. . . SEMICONDUCTOR DEVICE, DIODE, Silicon		1	
-32	7136035	. . . TRANSISTOR, Germanium, pnp		3	
-33	227082-1	. . . TRANSISTOR, Silicon, unijunction		1	
-34	USAF2N404	. . . TRANSISTOR		1	
-35	DELETED	. . . TRANSISTOR, Germanium, pnp		1	
-36	316815-1	. . . TRANSISTOR, Silicon, npn		1	
-37	Y0E90	. . . FERRULE, RADIO FREQUENCY CABLE, GROUNDING, Outer	09922	3	
-38	GSB071	. . . FERRULE, RADIO FREQUENCY CABLE, GROUNDING, Inner	59730	3	
-39	316262-1	. . . PRINTED CIRCUIT BOARD		1	

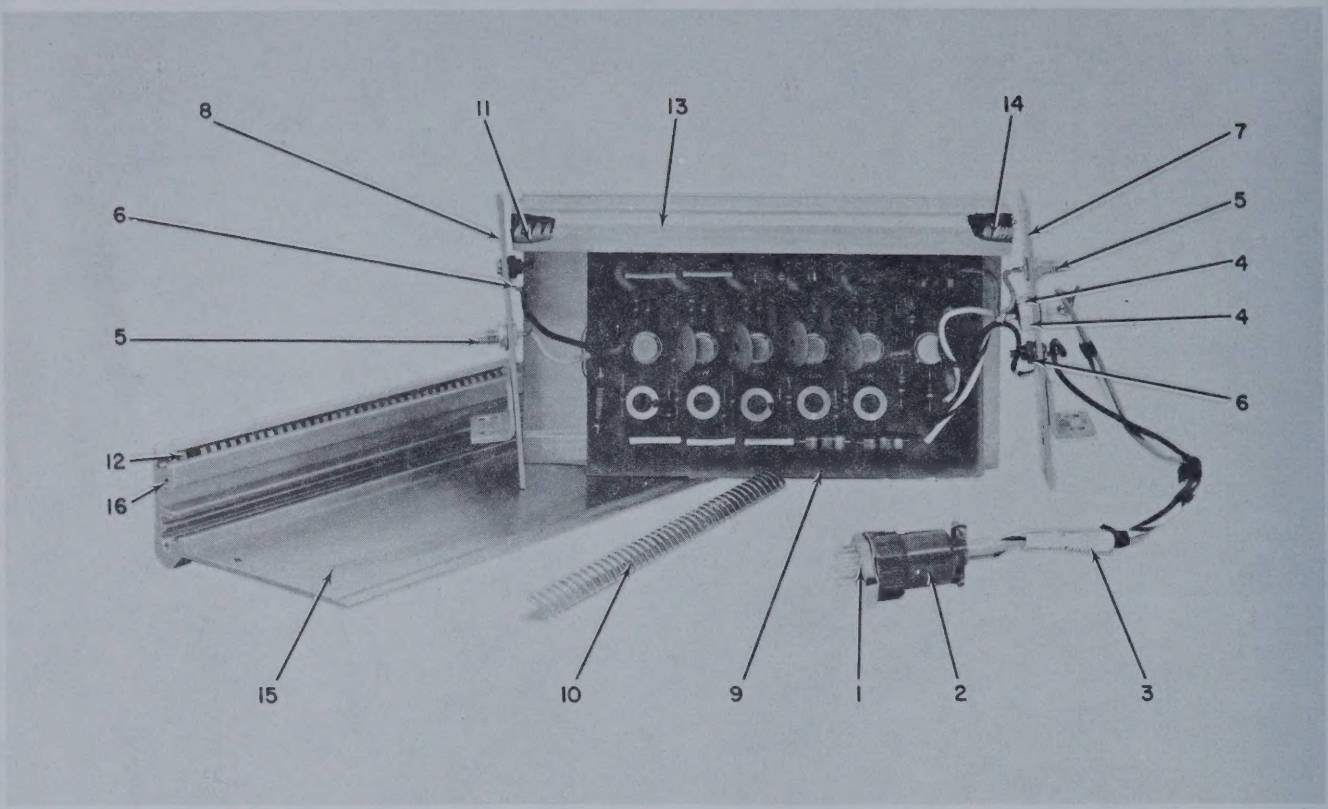


Figure 18. Intermediate Frequency Amplifier Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
18-	224804-1	. AMPLIFIER ASSEMBLY, INTERMEDIATE FREQUENCY, See Fig. 1-90 for NHA		REF	
-1	MS24056-2	. . CONNECTOR		1	
-2	MS24018-6	. . HOOD		1	
-3	317154-17	. . SLEEVE, MARKER, CABLE		1	
-4	148325-34	. . CAPACITOR, FIXED, CERAMIC DIELECTRIC, 1000 uuf, 20%, 500 wvdc		2	
-5	50-043-4401	. . CONNECTOR, RECEPTACLE, ELECTRICAL	98291	2	
-6	333	. . TERMINAL, LUG	79963	3	
		ATTACHING PARTS			
	MS35233-15	. . SCREW		2	
	50FM440	. . NUT, SELF-LOCKING, HEXAGON, No. 4-40 thd	56878	2	
		---*---			
-7	316241-1	. . COVER, AMPLIFIER, Left		1	
-8	316242-1	. . COVER, AMPLIFIER, Right		1	
		ATTACHING PARTS			
	MS35233-5	. . SCREW		8	
	MS35338-77	. . WASHER		8	
		---*---			
-9	227520-1	. . AMPLIFIER SUBASSEMBLY, INTERMEDIATE FREQUENCY, See Fig. 19		1	
-10	97-390A5-3/8	. . TERMINAL STRIP, GROUNDING	30817	2	
-11	97-251A5-3/8	. . TERMINAL STRIP, GROUNDING	30817	1	
-12	97-380A5-3/8	. . TERMINAL STRIP, GROUNDING	30817	1	
-13	316590-6	. . FRAME, SUPPORT		1	
-14	HS08656-50	. . . INSERT, SCREW THREAD	73957	4	
-15	227523-1	. . FRAME, SUPPORT		1	
-16	HS08656-50	. . . INSERT, SCREW THREAD	73957	4	

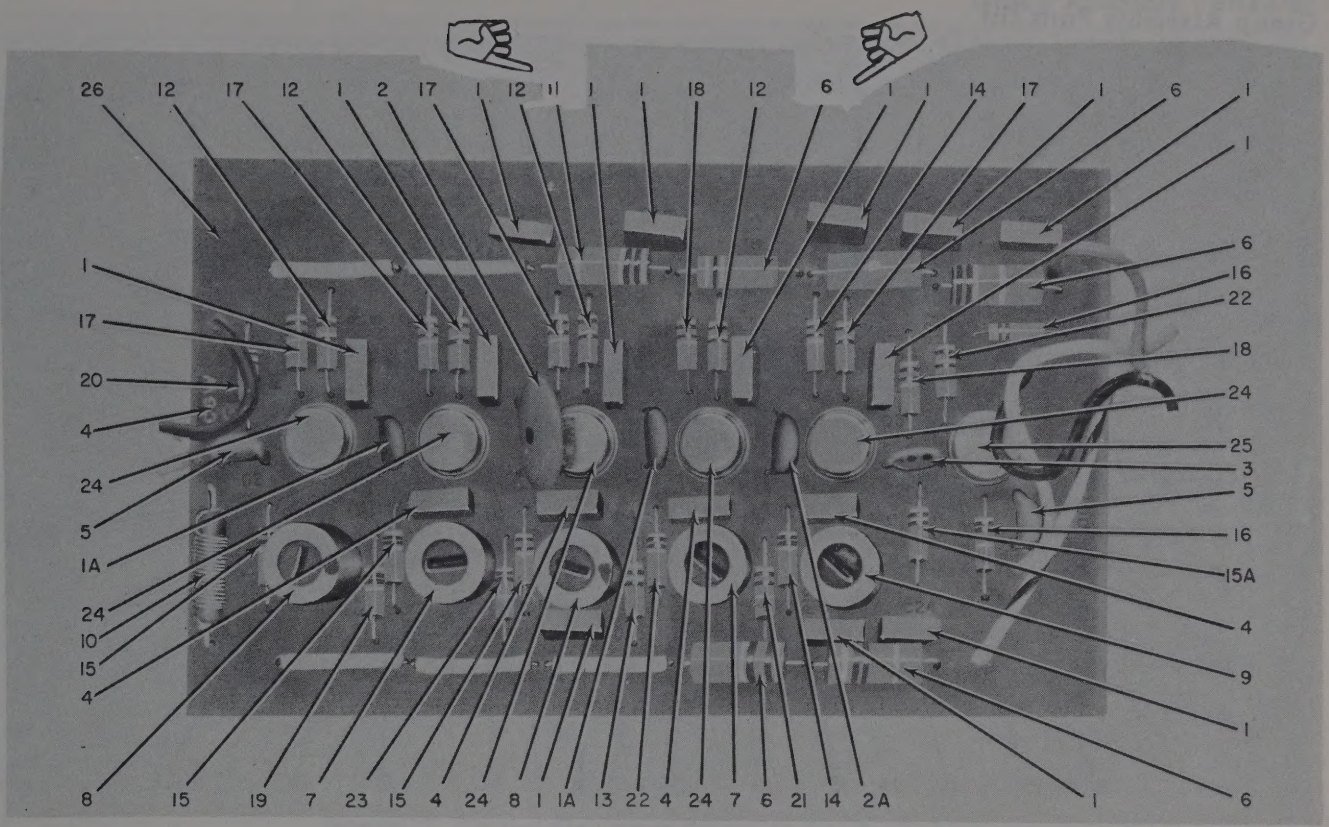


Figure 19. Intermediate Frequency Amplifier Subassembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
19-	227520-1	. . AMPLIFIER SUBASSEMBLY, INTERMEDIATE FREQUENCY, See Fig. 18-9 for NHA		REF	
-1	CK06CW222M	. . . CAPACITOR		13	
-1A	CM05D220J03	. . . CAPACITOR		2	
-2	CC52CH390J	. . . CAPACITOR		1	
-2A	CM05D680J03	. . . CAPACITOR		1	
-3	CC50CH100D	. . . CAPACITOR		1	
-4	TY06-121J	. . . CAPACITOR, FIXED, GLASS DIELECTRIC; 120 μμf, +5%, 300 wvdc	14674	5	
-5	CK60AW102M	. . . CAPACITOR		2	
-6	MS75008-28	. . . COIL		5	
-7	225789-4	. . . COIL, RADIO FREQUENCY, Variable, range 0.8 to 1.3 μh		2	
-8	225789-7	. . . COIL, RADIO FREQUENCY, Variable, range 2.2 to 3.6 μh		2	
-9	225789-9	. . . COIL, RADIO FREQUENCY, Variable, range 3.4 to 5.4 μh		1	
-10	227235-4	. . . COIL, RADIO FREQUENCY, 0.375 μh		1	
-11	RC20GF391J	. . . RESISTOR		1	
-12	RC07GF821J	. . . RESISTOR		4	
-13	RC07GF182J	. . . RESISTOR		1	
-14	RC07GF682J	. . . RESISTOR		2	
-15	RC07GF512J	. . . RESISTOR		3	
-15A	RC07GF242J	. . . RESISTOR		1	
-16	RC07GF201J	. . . RESISTOR		2	
-17	RC07GF332J	. . . RESISTOR		4	
-18	RC07GF302J	. . . RESISTOR		2	
-19	RC07GF417J	. . . RESISTOR		1	
-20	RC07GF820J	. . . RESISTOR		1	
-21	RC07GF132J	. . . RESISTOR		1	
-22	RC07GF103J	. . . RESISTOR		2	
-23	RC07GF102J	. . . RESISTOR		1	
-24	7136035	. . . TRANSISTOR, Germanium, pnp		5	
-25	316815-1	. . . TRANSISTOR, Silicon, npn		1	
-26	228368-1	. . . PRINTED CIRCUIT BOARD		1	

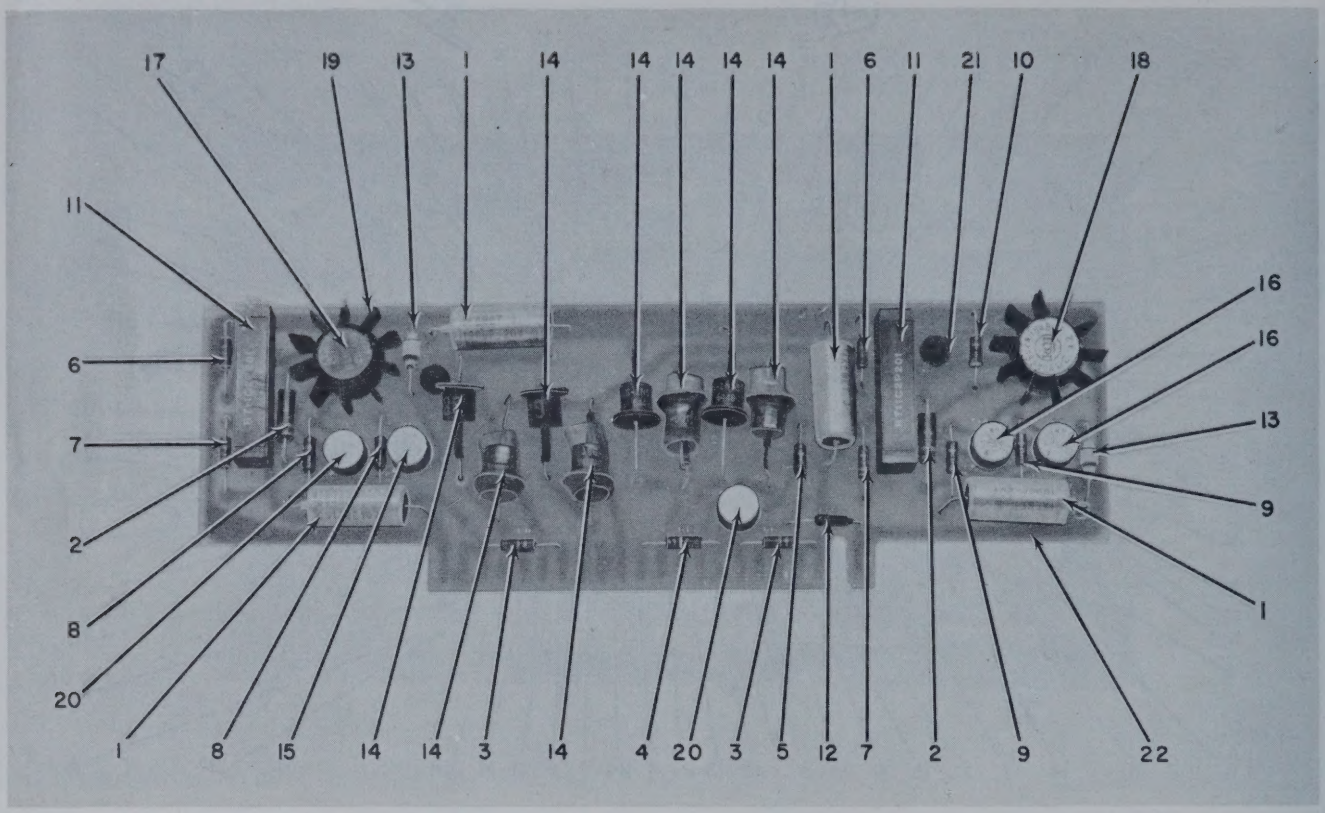


Figure 20. Power Supply

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
20-	316543-1	. POWER SUPPLY, See Fig. 1-93 for NHA		REF	
-1	CS13AE101K	. . CAPACITOR		4	
-2	RC20GF331J	. . RESISTOR		2	
-3	RC07GF123J	. . RESISTOR		2	
-4	RC07GF114J	. . RESISTOR		1	
-5	RC07GF682J	. . RESISTOR		1	
-6	RC07GF621J	. . RESISTOR		2	
-7	RC07GF331J	. . RESISTOR		2	
-8	RC07GF152J	. . RESISTOR		2	
-9	RC07GF102J	. . RESISTOR		2	
-10	RC07GF472J	. . RESISTOR		1	
-11	RT11C2P201	. . RESISTOR		2	
-12	USN1N986B	. . SEMICONDUCTOR DEVICE		1	
-13	USN1N754A	. . SEMICONDUCTOR DEVICE		2	
-14	JAN1N538	. . SEMICONDUCTOR DEVICE		8	
-15	JAN2N338	. . TRANSISTOR		1	
-16	USAF2N404	. . TRANSISTOR		2	
-17	USA2N1485	. . TRANSISTOR		1	
-18	316673-1	. . TRANSISTOR, Germanium, pnp		1	
-19	NF213	. . HEAT SINK, ELECTRICAL-ELECTRONIC COMPONENT	05820	2	
-20	316815-1	. . TRANSISTOR, Silicon, npn		2	
-21	1178-3	. . GROMMET, RUBBER	70485	2	
-22	316330-1	. . PRINTED CIRCUIT BOARD		1	

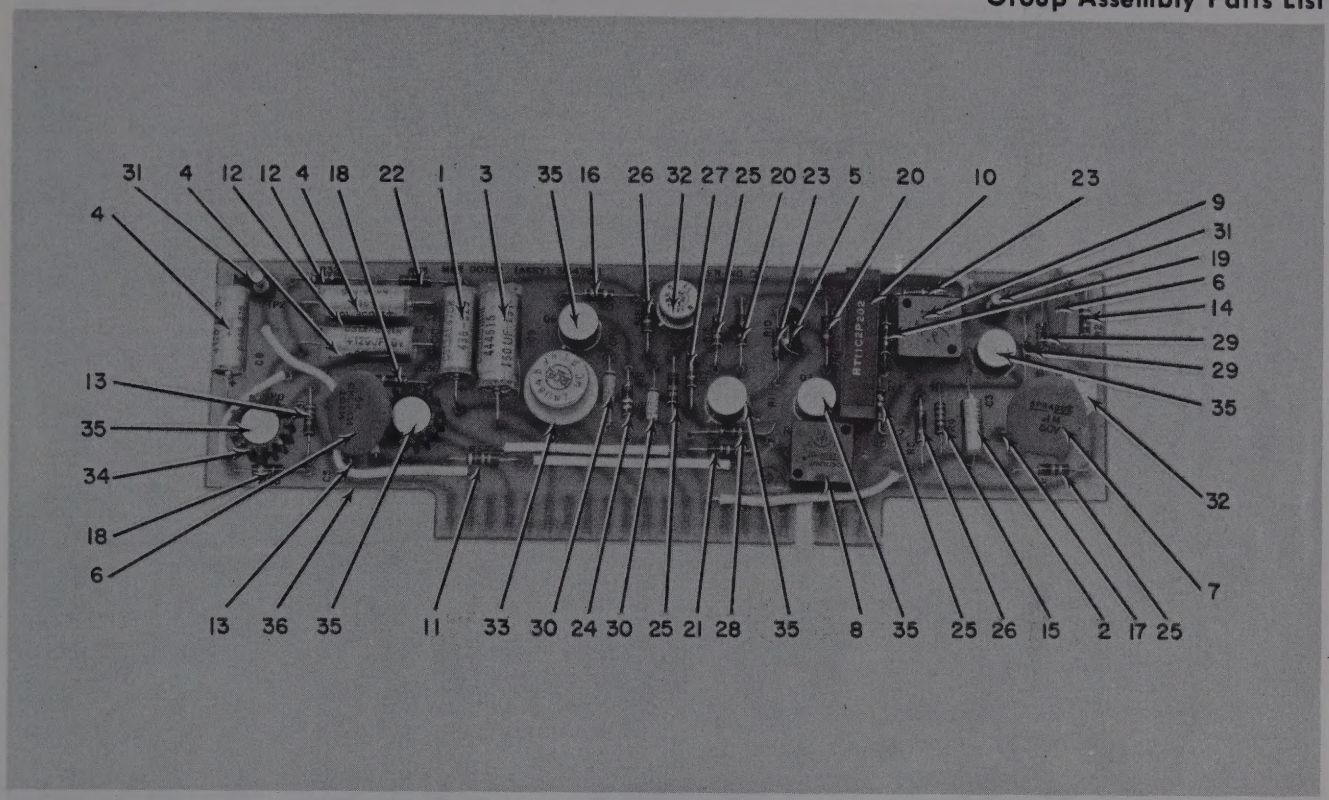
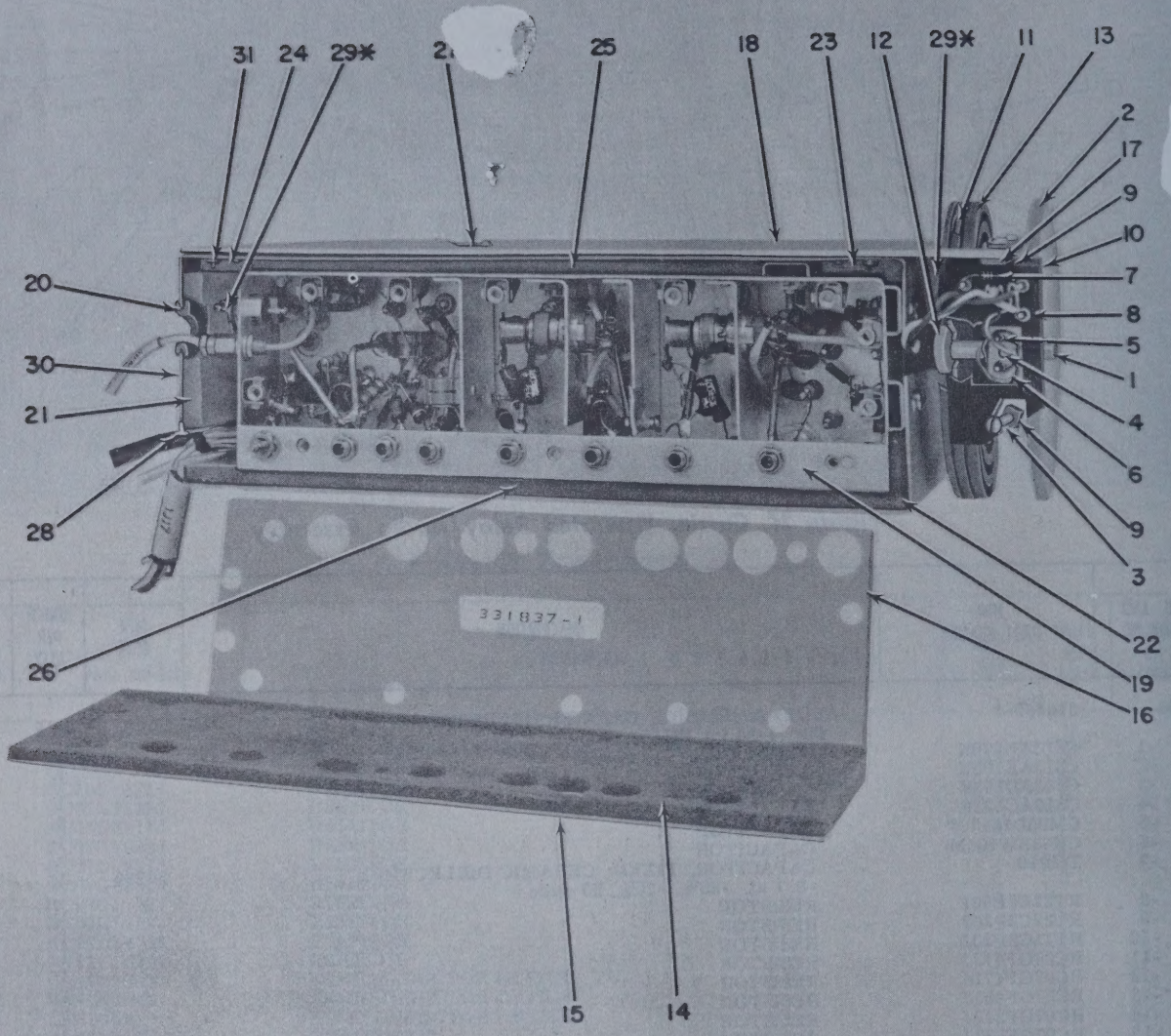


Figure 21. Carrier Operated Relay/Audio Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
21-	316439-1	. AUDIO ASSEMBLY, CARRIER OPERATED RELAY, See Fig. 1-94 for NHA		REF	
-1	CS13AE470K	. . CAPACITOR		1	
-2	CS13AE100K	. . CAPACITOR		1	
-3	CS13AD151K	. . CAPACITOR		1	
-4	CS13AC121K	. . CAPACITOR		3	
-5	CM05D101J03	. . CAPACITOR		1	
-6	CK63AW103M	. . CAPACITOR		2	
-7	TGP10	. . CAPACITOR, FIXED, CERAMIC DIELECTRIC, 0.1 µf, +80%, -20%, 50 wvdc	56289	1	
-8	RT22C2P501	. . RESISTOR		1	
-9	RT22C2P202	. . RESISTOR		1	
-10	RT11C2P202	. . RESISTOR		1	
-11	RC07GF473J	. . RESISTOR		1	
-12	RC07GF471J	. . RESISTOR		2	
-13	RC07GF433J	. . RESISTOR		2	
-14	RC07GF392J	. . RESISTOR		1	
-15	RC07GF333J	. . RESISTOR		1	
-16	RC07GF332J	. . RESISTOR		1	
-17	RC07GF331J	. . RESISTOR		1	
-18	RC07GF242J	. . RESISTOR		2	
-19	RC07GF223J	. . RESISTOR		1	
-20	RC07GF222J	. . RESISTOR		2	
-21	RC07GF221J	. . RESISTOR		1	
-22	RC07GF220J	. . RESISTOR		1	
-23	RC07GF152J	. . RESISTOR		2	
-24	RC07GF913J	. . RESISTOR		1	
-25	RC07GF103J	. . RESISTOR		4	
-26	RC07GF102J	. . RESISTOR		2	
-27	RC07GF101J	. . RESISTOR		1	
-28	RC07GF621J	. . RESISTOR		1	
-29	JAN1N914	. . SEMICONDUCTOR DEVICE		2	
-30	JAN1N277M	. . SEMICONDUCTOR DEVICE		2	
-31	1558-2-05	. . TERMINAL, STUD	71279	2	
-32	USAF2N404	. . TRANSISTOR		2	
-33	316673-1	. . TRANSISTOR, Germanium, pnp		1	
-34	3AL635-2R	. . HEAT SINK, ELECTRICAL-ELECTRONIC COMPONENT	07387	2	
-35	316815-1	. . TRANSISTOR, Silicon, npn		6	
-36	316313-1	. . PRINTED CIRCUIT BOARD		1	



* HIDDEN

Figure 22. Band B Tuner Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	1 2 3 4 5 6 7 8 9 DESCRIPTION	MFR CODE	UNITS PER ASSY	USABLE ON CODE
22-	316520-1	. TUNER ASSEMBLY, BAND B, See Fig. 1-101 for NHA		REF	
	317322-1	. . DIAL, CALIBRATED		1	
-1	226971-2	. . . HUB, DIAL		1	
-2	317322-6	. . . DIAL, CALIBRATED		1	
-3	316399-1	. . ROD, END		2	
		ATTACHING PARTS			
	MS35233-4	. . SCREW		4	
	MS35338-77	. . WASHER		4	
	MS15795-802	. . WASHER		8	
		---*---			
-4	683	. . LAMP, INCANDESCENT	24455	1	
	316427-1	. . INDICATOR ASSEMBLY, DIAL		1	
-5	1KD3-9D	. . . TERMINAL, STUD	86577	2	
-6	316427-6	. . . INDICATOR, DIAL		1	
-7	RC07GF220J	. . RESISTOR		1	
	316406-1	. . BRACKET ASSEMBLY, TUNER		1	
		ATTACHING PARTS			
	MS35233-14	. . SCREW		2	
	MS35338-78	. . WASHER		2	
	MS15795-803	. . WASHER		2	
		---*---			
-8	STSM16TUR	. . . TERMINAL, STUD	98291	3	
-9	CLS440-2	. . . NUT, PLAIN, CLINCH	46384	2	
-10	316406-6	. . . BRACKET, TUNER		1	
-11	AN6230-10	. . GASKET		1	
	316190-1	. . CAM ASSEMBLY, SPIRAL		1	
-12	317309-1	. . . HUB, CAM		1	
		ATTACHING PARTS			
	AN565AC6H2	. . . SETSCREW		2	
		---*---			
-13	316190-6	. . . CAM, SPIRAL		1	
	316588-1	. . COVER ASSEMBLY, TUNER		1	
		ATTACHING PARTS			
	MS35233-14	. . SCREW		11	
		---*---			
-14	316585-1	. . . SHEET, INSULATION		1	
-15	316560-1	. . . COVER, TUNER		1	
-16	331837-1	. . COVER, TUNER		1	
	316414-2	. . PLATE ASSEMBLY, SUPPORT		1	
		ATTACHING PARTS			
	AN507C440-3	. . SCREW		4	
		---*---			
-17	CLS440-2	. . . NUT, PLAIN, CLINCH	46384	2	
-18	316414-6	. . . PLATE, SUPPORT		1	
-19	316258-1	. . BAND B ASSEMBLY, RADIO FREQUENCY, See Fig. 23		1	
		ATTACHING PARTS			
	AN507C440-7	. . SCREW		3	
	MS35233-16	. . SCREW		2	
		---*---			
-20	MS35489-1	. . GROMMET		1	
	316468-2	. . CHASSIS, ELECTRICAL EQUIPMENT		1	
-21	316451-2	. . . SHEET, INSULATION		1	
-22	316452-1	. . . SHEET, INSULATION		1	
-23	316453-1	. . . SHEET, INSULATION		1	
-24	316454-1	. . . SHEET, INSULATION		1	
-25	316455-1	. . . SHEET, INSULATION		1	
-26	316456-1	. . . SHEET, INSULATION		1	
-27	316456-2	. . . SHEET, INSULATION		1	
-28	MS21266-1N	. . . GROMMET		AR	
-29	MS35489-4	. . . GROMMET		1	
-30	316415-2	. . . CHASSIS, ELECTRICAL EQUIPMENT		1	
-31	CLS440-1	. . . . NUT, PLAIN, CLINCH	46384	8	

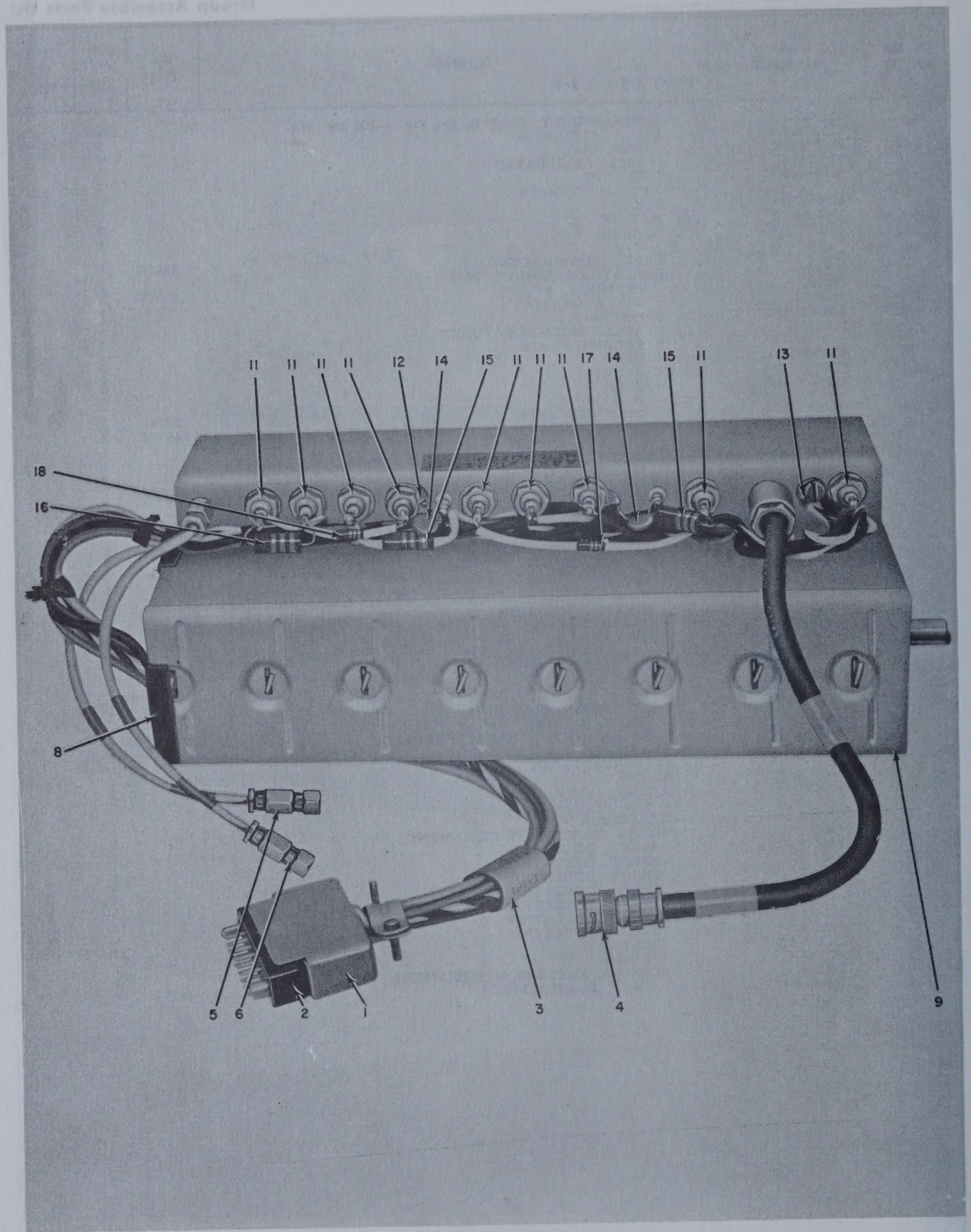


Figure 23. Radio Frequency Band B Assembly (Sheet 1 of 2)

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
23- -	316258-1	. . BAND B ASSEMBLY, RADIO FREQUENCY, See Fig. 22-19 for NHA		REF	
-1	MS24132R5	. . . HOOD		1	
-2	MS24014-1	. . . CONNECTOR		1	
-3	317154-5	. . . SLEEVE, MARKER, CABLE		1	
-4	317179-4	. . . CABLE ASSEMBLY, RADIO FREQUENCY, 1 foot, 2-3/4 inches, See Fig. 31		1	
-5	317179-5	. . . CABLE ASSEMBLY, RADIO FREQUENCY, 11-1/4 inches, See Fig. 27		1	
-6	317179-6	. . . CABLE ASSEMBLY, RADIO FREQUENCY, 8-1/8 inches, See Fig. 27		1	
-7	SLPSA	. . . HEATING ELEMENT, ELECTRICAL. 266 ohms, 10%, 50 w	13426	1	
-8	ZX4116	. . . CHANNEL, RUBBER	76385	AR	
-9	226978-2	. . . COIL ASSEMBLY, RADIO FREQUENCY		1	
		ATTACHING PARTS			
	MS35233-14	. . . SCREW		6	
		---*---			
-10	333	. . . TERMINAL, LUG	79963	5	
-11	148325-34	. . . CAPACITOR, FIXED, CERAMIC DIELECTRIC, 1000 μμf, 20%, 500 wvdc		11	
-12	110	. . . TERMINAL, LUG	79963	2	
-13	333	. . . TERMINAL, LUG	79963	1	
		ATTACHING PARTS			
	MS35233-14	. . . SCREW		1	
	58FH440	. . . NUT, SELF-LOCKING, HEXAGON, No. 4-40 thd	56878	1	
		---*---			
-14	CK60AW102M	. . . CAPACITOR		7	
-15	MS75008-42	. . . COIL		2	
-16	MS75008-34	. . . COIL		6	
-17	RC07GF101J	. . . RESISTOR		1	
-18	RC07GF152J	. . . RESISTOR		1	
-19	PC40J4R5	. . . CAPACITOR		7	
-20	226986-2	. . . COIL, RADIO FREQUENCY, Variable, range 0.37 μh to 0.47 μh		1	
-21	1454	. . . CLIP, ELECTRICAL	83330	2	
-22	227206-1 (8058)	. . . ELECTRON TUBE		2	
-23	226987-1	. . . SOCKET, ELECTRON TUBE		2	
-24	108069-26	. . . CAPACITOR, FIXED, ELECTROLYTIC, 2.2 μμf, 5%, 500 wvdc		2	
-25	108069-22	. . . CAPACITOR, FIXED, ELECTROLYTIC, 1.5 μμf, 5%, 500 wvdc		1	
-26	CC20SK010C	. . . CAPACITOR		3	
-27	CC20SK0R5C	. . . CAPACITOR		2	
-28	CM05D331J03	. . . CAPACITOR		1	
-29	CM05D101J03	. . . CAPACITOR		2	
-30	CM05D510J03	. . . CAPACITOR		1	
-30A	CM05C100K03	. . . CAPACITOR		1	
-31	CM05C080K03	. . . CAPACITOR		1	
-31A	317316-1	. . . COIL, RADIO FREQUENCY		3	
-32	317316-2	. . . COIL, RADIO FREQUENCY		3	
-33	317316-3	. . . COIL, RADIO FREQUENCY		1	
-33A	MS75008-33	. . . COIL		1	
-34	MS75008-28	. . . COIL		3	
-35	227235-6	. . . COIL, RADIO FREQUENCY, 0.17 μh		1	
-36	RC07GF510J	. . . RESISTOR		1	
-37	RC07GF472J	. . . RESISTOR		1	
-37A	RC07GF102J	. . . RESISTOR		2	
-38	RC07GF822J	. . . RESISTOR		1	
-39	RC07GF223J	. . . RESISTOR		1	
-40	RC07GF222J	. . . RESISTOR		2	
-41	RC07GF103J	. . . RESISTOR		3	
-41A	RC07GF333J	. . . RESISTOR		1	
-41B	RC07GF110J	. . . RESISTOR		1	
-42	RC07GF100J	. . . RESISTOR		1	
-43	316675-1	. . . RESISTOR, THERMAL, 5000 ohms, 10%, 4 mw		1	
-44	317275-1	. . . TRANSFORMER, RADIO FREQUENCY, 0.18 μh to 1.18 μh		1	
-45	2N2398	. . . TRANSISTOR, Germanium, PNP, (26988-1)	56289	1	
-45A	2N2398	. . . TRANSISTOR, Germanium, PNP, (26988-3)	56289	2	
-46	1481B	. . . TERMINAL, STUD	15849	11	
		ATTACHING PARTS			
	MS35249-8	. . . SCREW		11	
	MS35338-77	. . . WASHER		11	
	MS15795-802	. . . WASHER		11	
		---*---			
-47	426	. . . TERMINAL, LUG	79963	1	
		ATTACHING PARTS			
	MS35249-10	. . . SCREW		1	
	58FH256	. . . NUT, SELF-LOCKING, HEXAGON, No. 2-56 thd	56878	1	
		---*---			

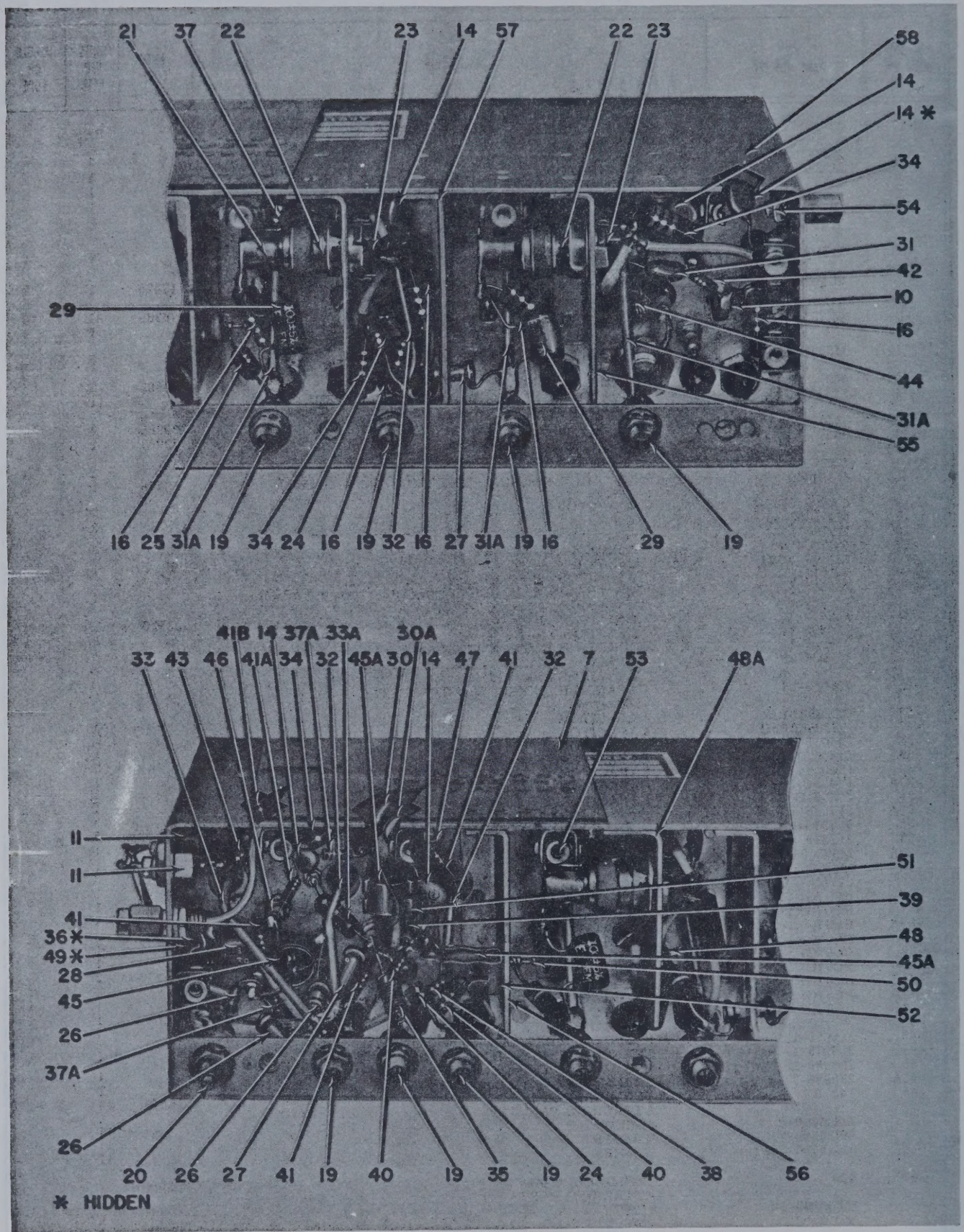


Figure 23. Radio Frequency Band B Assembly (Sheet 2 of 2)

FIG. AND INDEX NO.	MFR PART NUMBER	1 2 3 4 5 6 7 8 9 DESCRIPTION	MFR CODE	UNITS PER ASSY	USABLE ON CODE
23-	331804-1	. . . BRACKET ASSEMBLY, ANGLE		1	
		ATTACHING PARTS			
	MS35249-11	. . . SCREW		2	
	58FH256	. . . NUT, SELF-LOCKING, HEXAGON, No. 2-56 thd	56878	2	
		---*---			
-48	STSM1TUR	. . . . TERMINAL, STUD	98291	1	
-48A	331804-6	. . . . BRACKET, ANGLE		1	
	331836-1	. . . CHASSIS, ELECTRICAL EQUIPMENT		1	
-49	STSM1TUR	. . . . TERMINAL, STUD	98291	3	
-50	FTSM4TUR	. . . . TERMINAL, FEEDTHRU, INSULATED	98291	1	
-51	6024-4A	. . . . CLIP, SPRING TENSION	91506	1	
		ATTACHING PARTS			
	MS20426A2-3	. . . . RIVET		1	
		---*---			
-52	6024-4A	. . . . CLIP, SPRING TENSION	91506	1	
		ATTACHING PARTS			
	MS20470A2-3	. . . . RIVET		1	
		---*---			
-53	LHA27M2860-40	. . . . NUT, SELF-LOCKING, PLATE	72962	8	
-54	LHTA3300-40	. . . . NUT, SELF-LOCKING, PLATE	72962	8	
		ATTACHING PARTS			
	MS20426A2-3	. . . . RIVET		32	
		---*---			
-55	331836-7	. . . . BRACKET, SUPPORT		1	
-56	331836-8	. . . . BRACKET, SUPPORT		1	
-57	331836-9	. . . . BRACKET, SUPPORT		1	
		ATTACHING PARTS			
	MS20426A2-3	. . . . RIVET		21	
		---*---			
-58	331836-6	. . . . CHASSIS, ELECTRICAL EQUIPMENT		1	

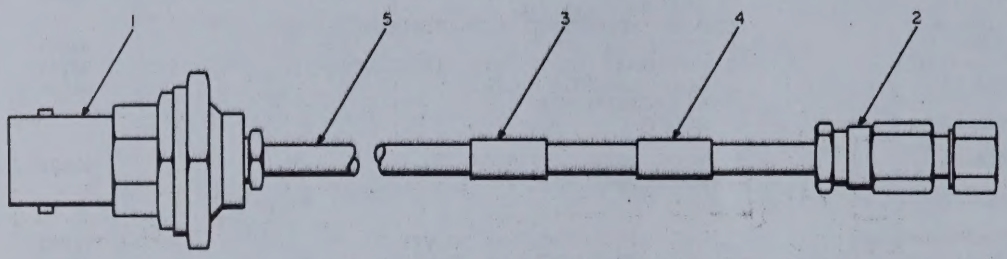


Figure 24. Radio Frequency Cable Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
24-	317166-5	. CABLE ASSEMBLY, RADIO FREQUENCY, 8-1/4 inches, See Fig. 1-36 for NHA		REF	
-1	316583-1	. . CONNECTOR, RECEPTACLE, ELECTRICAL		1	
-2	50-007-0000	. . CONNECTOR, PLUG, ELECTRICAL	98291	1	
-3	317154-38	. . SLEEVE, MARKER, CABLE		1	
-4	317154-33	. . SLEEVE, MARKER, CABLE		1	
-5	RG188A/U	. . CABLE		AR	

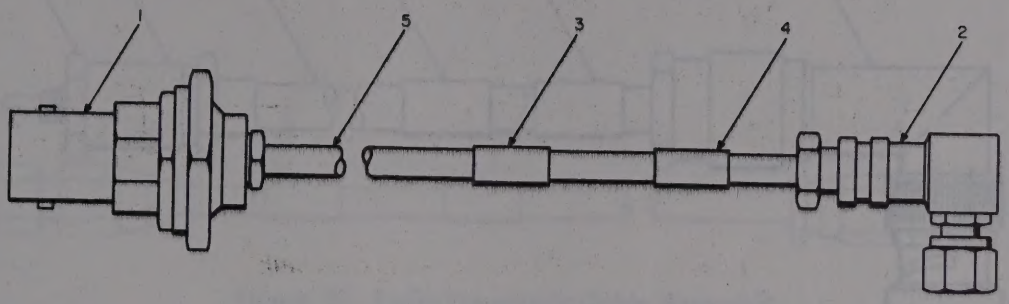


Figure 25. Radio Frequency Cable Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
25-	317166-6	. CABLE ASSEMBLY, RADIO FREQUENCY, 1 foot, 2-1/8 inches See Fig. 1-45 for NHA		REF	
-1	316583-1	. . CONNECTOR, RECEPTACLE, ELECTRICAL		1	
-2	50-011-0000	. . CONNECTOR, PLUG, ELECTRICAL	98291	1	
-3	317154-39	. . SLEEVE, MARKER, CABLE		1	
-4	317154-34	. . SLEEVE, MARKER, CABLE		1	
-5	RG188A/U	. . CABLE		AR	

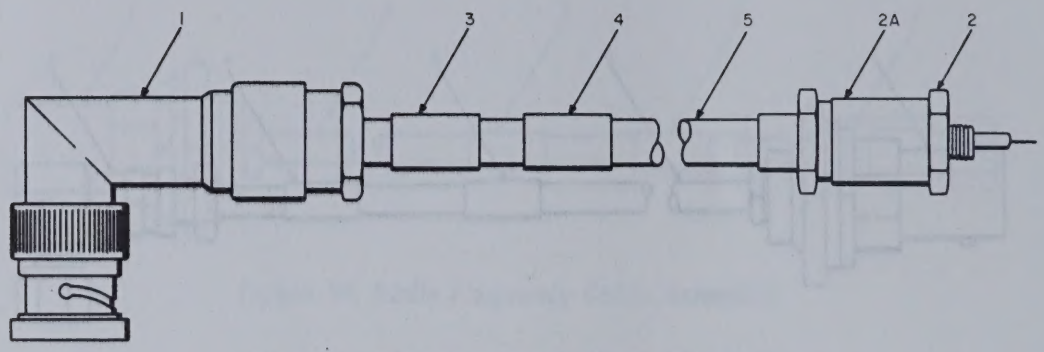


Figure 26. Radio Frequency Cable Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
26-	317179-1	. . . CABLE ASSEMBLY, RADIO FREQUENCY, 11-1/2 inches, See Fig. 4-4 for NHA		REF	
-1	MS35367-913A	. . . . CONNECTOR		1	
-2	MX1684/U	. . . . FERRULE		1	
-2A	312491-9	. . . . INSULATION SLEEVING, ELECTRICAL		AR	A
-3	317154-2	. . . . SLEEVE, MARKER, CABLE		1	
-4	317154-40	. . . . SLEEVE, MARKER, CABLE		1	
-5	RG58C/U	. . . . CABLE		AR	

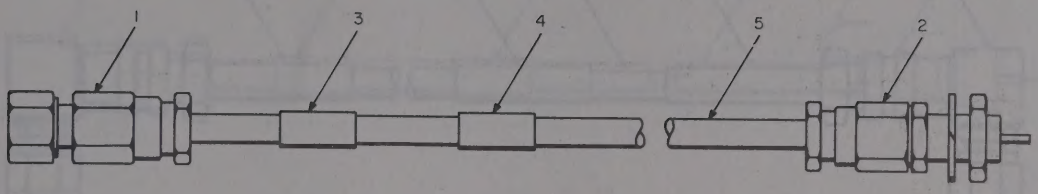


Figure 27. Radio Frequency Cable Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
27-	317179-2	. . . CABLE ASSEMBLY, RADIO FREQUENCY, 9-1/2 inches, See Fig. 4-5 for NHA		REF	
27-	317179-3	. . . CABLE ASSEMBLY, RADIO FREQUENCY, 9-1/4 inches, See Fig. 4-6 for NHA		REF	
27-	317179-5	. . . CABLE ASSEMBLY, RADIO FREQUENCY, 11-1/4 inches, See Fig. 23-5 for NHA		REF	
27-	317179-6	. . . CABLE ASSEMBLY, RADIO FREQUENCY, 8-1/8 inches, See Fig. 23-6 for NHA		REF	
27-	317179-7	. . . CABLE ASSEMBLY, RADIO FREQUENCY, 7-3/8 inches, See Fig. 11-7 for NHA		REF	
27-	317179-10	. . . CABLE ASSEMBLY, RADIO FREQUENCY, 3 inches, See Fig. 11-10 for NHA		REF	
-1	50-007-0000	. . . . CONNECTOR, PLUG, ELECTRICAL	98291	1	
-2	55-013-4401	. . . . CONNECTOR, RECEPTACLE, ELECTRICAL	98291	1	
-3	317154-3	. . . . SLEEVE, MARKER, CABLE (used on 317179-2)		1	
	317154-4	. . . . SLEEVE, MARKER, CABLE (used on 317179-3)		1	
	317154-7	. . . . SLEEVE, MARKER, CABLE (used on 317179-5)		1	
	317154-8	. . . . SLEEVE, MARKER, CABLE (used on 317179-6)		1	
	317154-11	. . . . SLEEVE, MARKER, CABLE (used on 317179-7)		1	
	317154-14	. . . . SLEEVE, MARKER, CABLE (used on 317179-10)		1	
-4	317154-41	. . . . SLEEVE, MARKER, CABLE (used on 317179-2)		1	
	317154-42	. . . . SLEEVE, MARKER, CABLE (used on 317179-3)		1	
	317154-44	. . . . SLEEVE, MARKER, CABLE (used on 317179-5)		1	
	317154-45	. . . . SLEEVE, MARKER, CABLE (used on 317179-6)		1	
	317154-46	. . . . SLEEVE, MARKER, CABLE (used on 317179-7)		1	
	317154-49	. . . . SLEEVE, MARKER, CABLE (used on 317179-10)		1	
-5	RG188A/U	. . . . CABLE		AR	

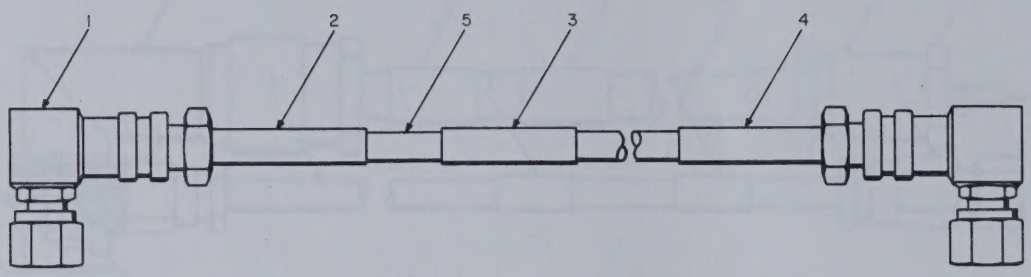


Figure 28. Radio Frequency Cable Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
28-	317166-1	. CABLE ASSEMBLY, RADIO FREQUENCY, 1 foot, 1-3/8 inches, See Fig. 1-89 for NHA		REF	
28-	317166-2	. CABLE ASSEMBLY, RADIO FREQUENCY, 4-1/2 inches, See Fig. 1-66 for NHA		REF	
28-	317166-3	. CABLE ASSEMBLY, RADIO FREQUENCY, 4-1/8 inches, See Fig. 1-82 for NHA		REF	
28-	317166-4	. CABLE ASSEMBLY, RADIO FREQUENCY, 6-7/8 inches, See Fig. 1-87 for NHA		REF	
-1	50-011-0000	. . CONNECTOR, PLUG, ELECTRICAL	98291	2	
-2	317154-25	. . SLEEVE, MARKER, CABLE, (used on 317166-1)		1	
	317154-26	. . SLEEVE, MARKER, CABLE, (used on 317166-2)		1	
	317154-27	. . SLEEVE, MARKER, CABLE, (used on 317166-3)		1	
	317154-28	. . SLEEVE, MARKER, CABLE, (used on 317166-4)		1	
-3	317154-21	. . SLEEVE, MARKER, CABLE, (used on 317166-1)		1	
	317154-22	. . SLEEVE, MARKER, CABLE, (used on 317166-2)		1	
	317154-23	. . SLEEVE, MARKER, CABLE, (used on 317166-3)		1	
	317154-24	. . SLEEVE, MARKER, CABLE, (used on 317166-4)		1	
-4	317154-29	. . SLEEVE, MARKER, CABLE, (used on 317166-1)		1	
	317154-30	. . SLEEVE, MARKER, CABLE, (used on 317166-2)		1	
	317154-31	. . SLEEVE, MARKER, CABLE, (used on 317166-3)		1	
	317154-32	. . SLEEVE, MARKER, CABLE, (used on 317166-4)		1	
-5	RG188A/U	. . CABLE		AR	

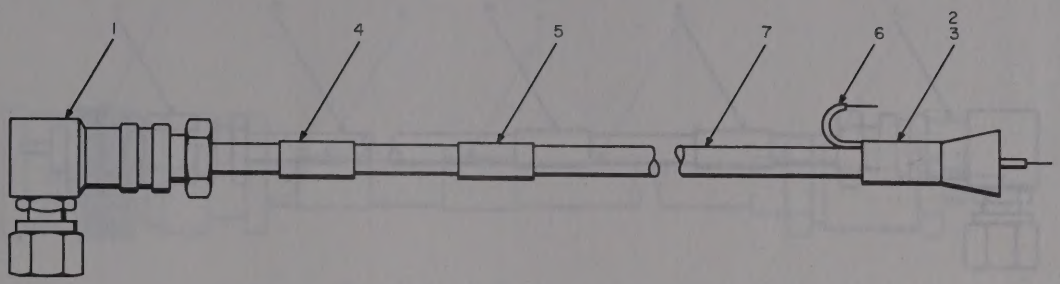


Figure 29. Radio Frequency Cable Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
29-	317175-1	. CABLE ASSEMBLY, RADIO FREQUENCY, 3-1/8 inches, See Fig. 1-73 for NHA		REF	
29-	317175-2	. CABLE ASSEMBLY, RADIO FREQUENCY, 3-1/8 inches, See Fig. 1-74 for NHA		REF	
-1	50-011-0000	. . CONNECTOR, PLUG, ELECTRICAL	98291	1	
-2	Y0E90	. . FERRULE, RADIO FREQUENCY CABLE, GROUNDING, Outer	09922	1	
-3	YIC071	. . FERRULE, RADIO FREQUENCY CABLE, GROUNDING, Inner	09922	1	
-4	317154-35	. . SLEEVE, MARKER, CABLE (used on 317175-1)		1	
	317154-36	. . SLEEVE, MARKER, CABLE (used on 317175-2)		1	
-5	317154-52	. . SLEEVE, MARKER, CABLE (used on 317175-1)		1	
	317154-53	. . SLEEVE, MARKER, CABLE (used on 317175-2)		1	
-6	990166-0	. . WIRE, ELECTRICAL, 5 inches		1	
-7	RG188A/U	. . CABLE		AR	

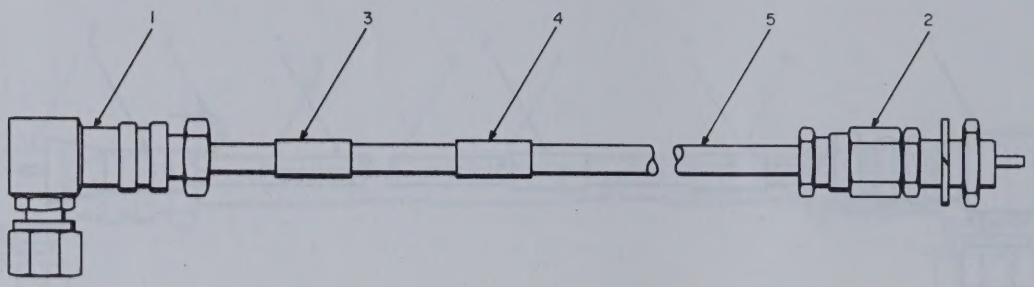


Figure 30. Radio Frequency Cable Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
30-	317179-8	. . . CABLE ASSEMBLY, RADIO FREQUENCY, 4-5/8 inches, See Fig. 11-8 for NHA		REF	
30-	317179-9	. . . CABLE ASSEMBLY, RADIO FREQUENCY, 4 inches, See Fig. 11-9 for NHA		REF	
30-	317179-11	. . . CABLE ASSEMBLY, RADIO FREQUENCY, 2-3/4 inches, See Fig. 11-11 for NHA		REF	
30-	317179-12	. . . CABLE ASSEMBLY, RADIO FREQUENCY, 2-1/2 inches, See Fig. 11-12 for NHA		REF	
-1	50-011-0000	. . . . CONNECTOR, PLUG, ELECTRICAL	98291	1	
-2	55-013-4401	. . . . CONNECTOR, RECEPTACLE, ELECTRICAL	98291	1	
-3	317154-12	. . . . SLEEVE, MARKER, CABLE (used on 317179-8)		1	
	317154-13	. . . . SLEEVE, MARKER, CABLE (used on 317179-9)		1	
	317154-15	. . . . SLEEVE, MARKER, CABLE (used on 317179-11)		1	
	317154-16	. . . . SLEEVE, MARKER, CABLE (used on 317179-12)		1	
-4	317154-47	. . . . SLEEVE, MARKER, CABLE (used on 317179-8)		1	
	317154-48	. . . . SLEEVE, MARKER, CABLE (used on 317179-9)		1	
	317154-50	. . . . SLEEVE, MARKER, CABLE (used on 317179-11)		1	
	317154-51	. . . . SLEEVE, MARKER, CABLE (used on 317179-12)		1	
-5	RG188A/U	. . . . CABLE		AR	

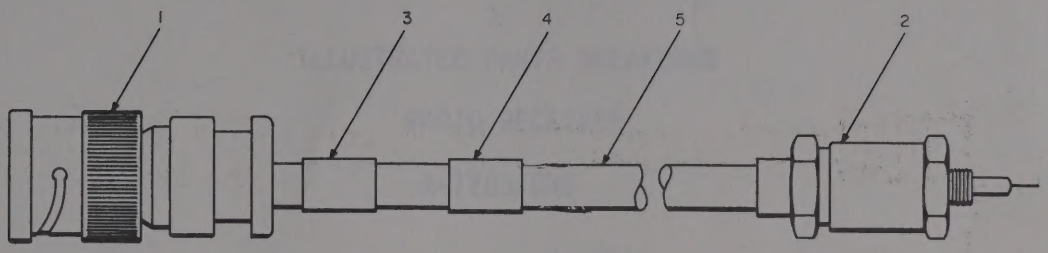


Figure 31. Radio Frequency Cable Assembly

FIG. AND INDEX NO.	MFR PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8 9	MFR CODE	UNITS PER ASSY	USABLE ON CODE
31-	317179-4	. . . CABLE ASSEMBLY, RADIO FREQUENCY, 1 foot, 2-3/4 inches, See Fig, 23-4 for NHA		REF	
-1	MS35168-88E	. . . . CONNECTOR		1	
-2	MX1684/U	. . . . FERRULE		1	
-3	317154-6	. . . . SLEEVE, MARKER, CABLE		1	
-4	317154-43	. . . . SLEEVE, MARKER, CABLE		1	
-5	RG58C/U	. . . . CABLE		AR	

☆ U.S.GPO:1975-0-665-687/SM4058

SUPPLEMENT

TECHNICAL MANUAL

ILLUSTRATED PARTS BREAKDOWN

RADIO RECEIVER

R-1283/GRC

THIS PUBLICATION SUPPLEMENTS T.O. 31R2-5SSVR-4 DATED 15 NOVEMBER 1966, AND REPLACES T.O. 31R2-5SSVR-4C, DATED 15 MARCH 1977. Reference to this supplement will be made on the title page of the basic manual by personnel responsible for maintaining the publication in current status.

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PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE

15 NOVEMBER 1977

1. PURPOSE.

To reflect corrective action of AFTO Form(s) 22 against the basic manual.

2. INSTRUCTIONS.

On page 4-3, Figure and Index No. 1-39, the following changes are made:

a. MFR Part No. 316505-1 is changed to 410Y15.

b. Under MFR code column, opposite Part No. 316505-1, 75382 is added.

THE END

SUPPLEMENT

TECHNICAL MANUAL

SERVICE AND CIRCUIT DIAGRAMS

RADIO RECEIVER

R-1283/GRC

THIS PUBLICATION SUPPLEMENTS TO 31R2-5SSVR-2 DATED 17 JULY 1980. Reference to this supplement will be made on the title page of the basic manual by personnel responsible for maintaining the publication in current status.

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PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE

1 MAY 1981

1. PURPOSE.

To reflect action of AFTO Form(s) 22 against the basic manual.

2. INSTRUCTIONS.

On page 5-43, paragraph 5-35.a.(3), in the second line, -41db is changed to: -40db.

THE END